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FROM

MEMOIRS

OF

MILITARY SURGERY,

VOL. I.

MEMOIRS

OF

MILITARY SURGERY,

AND

CAMPAIGNS

OF THE FRENCH ARMIES,

ON THE RHINE, IN CORSICA, CATALONIA, EGYPT, AND SYRIA; AT BOULOGNE, ULM, AND AUSTERLITZ; IN SAXONY, PRUSSIA, POLAND, SPAIN, AND AUSTRIA.

FROM THE FRENCH OF D. J. LARREY, M. D.

First Surgeon of the Imperial Guards, Inspector-general of the Medical Staff of the French Armies, &c. Baron of the Empire, Commandant of the Legion of Honour, Knight of the order of the Iron Crown, &c. &c. &c.

BY RICHARD WILLMOTT HALL, M. D.,

PROFESSOUR OF MIDWIFERY AND OF THE DISEASES OF WOMEN AND CHILDREN IN THE UNIVERSITY OF MARYLAND.

With Notes by the Translator.

FIRST AMERICAN FROM THE SECOND PARIS EDITION.

VOL. I.

BALTIMORE:

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1814.

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District of Maryland, to wit:

BE IT REMEMBERED, That on this ninth day of March, in the thirty-eighth year of the Independence of the United States of America, Richard Willmott Hall, of the said district, hath deposited in this office the Title of a Book, the right whereof he claims as Proprietor, in the words following, to wit:

SEAL.

"Memoirs of Military Surgery and Campaigns of the French Armies, on the Rhine, in Corsica, Catalonia, Italy, Egypt, and Syria; at Boulogne, Ulm, and Austerlitz; in Saxony, Prussia, Poland, Spain, and Austria. From the French of D. J. Larrey, M. D. first surgeon of the imperial guards, inspector general of the medical staff of the French armies &c. &c. baron of the empire, commandant of the legion of honour, knight of the order of the iron crown &c. &c. By Richard Willmot Hall, M. D. professour of midwifery and of the diseases of women and children in the University of Maryland. With notes by the translator. First American from the second Paris edition."

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PHILIP MOORE, Clerk of the District of Maryland.

FROM THE UNIVERSITY PRESS OF SERGEANT HALL,
134, BALTIMORE STREET.

PREFACE.

IN offering the interesting work of Dr. Larrey to the American publick in an English dress, the translator flatters himself he will contribute to the gratification of the general reader, while he lays before his brethren of the profession of physick such a variety of important facts and observations in the several departments of the science, as cannot fail to be acceptable. Few individuals in any age or country have been furnished with such extensive opportunities of acquiring a practical knowledge of military surgery as this author enjoyed, during the numerous and active campaigns of the French armies, in Asia, Africa, and Europe, from the year 1792 till 1812.

In several parts of the work minute topographical descriptions and unimportant details have been omitted, while particular care has been taken to retain whatever was calculated to administer to the pleasure or instruction of the American reader.

The work, originally in three volumes, is now comprised in two; and the narratives of the campaigns have been generally given entire.

The Gregorian has been throughout substituted for the republican calendar, and a table of French weights and measures annexed. Some of the foot-notes by the translator serve as explanations to the text, and others have been added, more with a view to elicit inquiry on doctrines advanced by the author than to promulgate facts or opinions which are new or uncommon.

Baltimore, March 20th, 1814.

TABLE

OF FRENCH WEIGHTS AND MEASURES

Used in this work.

MEASURES OF LENGTH.

	English Inches.
Metre	39.37100
Decimetre	3.93710
Centimetre	.39371
Millimetre	.03937

MEASURES OF CAPACITY.

	Cubick Inches.
Litre	61.02800
Decilitre	6.10280
Centiletre	.61028
Millilitre	.06103

MEASURES OF WEIGHT.

	English Grains
Gramme	15.4440
Decigramme	1.5444
Centigramme	.1544
Milligramme	.0154

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AUTHOR'S INTRODUCTION.

As the first edition of my *Surgical Account of the Army of the East* has been long since disposed of, at the solicitation of the surgeons of the army, I now republish it with the addition of a concise historical account of the campaigns in which I have been engaged both before and since the memorable expedition of the French army into Egypt.

The narrative of these campaigns, which are arranged in chronological order, is conducted on the plan that I have chosen for my surgical "account of the army of the east." I am aware that this plan has been the subject of some criticisms, for which perhaps there was sufficient ground: still I believe that by adding to the recital of whatever relates to the practice of surgery in the armies, a brief sketch of the principal military events which I have witnessed, and a succinct description of the most remarkable places to which my duties led me; I shall not lose sight of my intention, which is to contribute

to the instruction of young surgeons, to whom this work is specially dedicated.

The details which may appear to be unconnected with military surgery, the principal object of their studies, and facts which might seem foreign to our subject, will often present to their observation, opinions which it will be important to combine, in order to discharge their duty with success in camps and hospitals.

One of the most certain means of exciting their emulation, and of promoting their advancement, is to place before their eyes the dangers to which surgeons of the army have been exposed, their success, and the encouragement which they have received: and I am of the opinion that I could not effect this in a manner more consistent with these intentions, than by pursuing the plan which I am here endeavouring to vindicate.

On the contrary, if I had not followed this plan, it would have been impossible to explain to my readers the causes of those extraordinary wounds which were received in battle, and the diseases with which these wounds were often complicated. To those who prefer the recital of the campaigns without the interruptions which must arise from

the details of surgery that often break the thread of the historical part, I would beg leave to observe, that it might perhaps be proper for them to have some knowledge of the nature and severity of the wounds and diseases which I have here described. This class of readers will add to the solicitude which they must feel for the brave men who have been wounded, those sentiments which will lead them to appreciate the important benefits that the healing art can afford to these honourable victims; and by adverting to the various dangers to which army surgeons are exposed, while labouring to secure the wounded and sick to their country and families, they will afford us that tribute of respect which we value as one of the best recompenses of our labours.

As the reader advances in these memoirs, he will observe that the cursory topographick descriptions to which I have turned aside, have often led me to speak of some interesting subjects of natural history; of the physical constitution of the inhabitants of those countries where I was; of the diseases endemick in those climates, and the curative means which were there used. This, I repeat it, will be useful to the officers of the medical staff,

and appears to me to be necessarily connected with the principal object of my undertaking.

I have taken as my model, the celebrated work of Ambroise Pare; and on this point, as the basis of my work on Egypt, M. Sabatier, the Pare of the present century, has honoured me with his approbation.*

These *Memoirs* and *Campaigns*, present a successive account of my labours since the commencement of my surgical career to the end of the year 1811.

After having expressed in a few words at the beginning of the first volume, the encouragements by which I was induced to advance in the difficult course that I had engaged in; I have there described the boisterous voyage which I made to North America, and have thought proper to give an account of the principal events of our passage. The varieties which our voyage presented in every sea, render a knowledge of these facts still more interesting and useful. Several remarks on some points of natural history, may perhaps add to its interest. I beg leave to draw the attention of the reader, to what I

* His letter is too highly flattering to be introduced here.

have said on sea sickness, and to my observations on some of the means of preserving health at sea, and on the surgery of the savages of Newfoundland (Esquimaux.)

In the 2d part of the same volume, I have noticed some of the first events of the revolution, in order to point out many of the important surgical operations which were rendered necessary by the wounds received at that time. I have then given a rapid sketch of the Campaigns on the Rhine, in Piedmont, in Catalonia, and Italy, where I have taken care to relate some interesting facts relative to surgery, anatomy and the contagious diseases of animals.

During the first of these campaigns, I invented and constructed the "*ambulance*" or flying hospital, for the purpose of affording assistance to the wounded on the field of battle. I have referred the description of it to the campaign of Italy, during which, by the order of the commander in chief, I found means to bring it to perfection and to complete its organization on the military establishment. A knowledge of the details which I have made relative to this ambulance, appear to be necessary for every army-surgeon.

To the engravings of my ambulance, I have added an engraving of that invented by baron Percy while I was in Egypt.

The difference between them, will be seen on inspection, and will explain the respective advantages which either may possess, according to circumstances.

The two first campaigns in Egypt and Syria, included in my surgical account of the army of the east, conclude the first volume of this edition. Without making a change in the plan of the Memoirs of Surgery, I have made many important additions to them. The most considerable of these, is my memoir on the plague; a disease of which I should not have spoken, had it not attacked those who were wounded at St. Jean d'Acre, in Syria.

In Vol. II. I have given a succinct narrative of facts which came under the notice of the medical staff. These were collected from my fellow-labourers, in the different provinces of the *Delta*, and in the division of Desaix, during the expedition to Syria in which I bore a part: I have there described the memorable battle of Aboukir, which was fought at the return of the army, and so gloriously crowned the labours of the commander in chief.

The bold and successful operations which we performed on this occasion, appear to us worthy of some attention. The rapidity with which the wounds cicatrized, is also a subject of surprise. General Fugieres who at present enjoys perfect health, affords a rare example of a cure, after a wound of unusual severity.

When general Kleber took the command of the army, many events succeeded, which might have been passed without notice, had they not unfolded the resources of our art, in those embarrassing conjunctures in which we were then placed: I allude to the period when the treaty of peace which had been concluded at El Arych was violated. We were then surrounded with many dangers, and were obliged to surmount various difficulties. At the battle of Heliopolis, we were obliged to make use of our own linen to dress the wounded, as our stores had been sent to Alexandria, where we expected to embark for France.

The re-establishment of our hospitals, was an undertaking of difficulty, and our wants were increased during the siege of Cairo, which was the only city that could afford us a supply.

During the seige of this city, the wounded were attacked by a putrid and remittent bilious fever, which I have called the yellow fever, because it presented the same characters as the fever which has been so distinguished by authors. Some of the physicians in the army of Egypt, who had never visited our wounded, have doubted its existence. But I have, in my memoir on that subject, enumerated the names of many of their colleagues, whose opinion of this disease coincided with mine. The English, and in particular their soldiers who came from India, were not less afflicted than ours by this acute disease, which presents varieties in this climate, that have not been observed in the fever of the Antilles. Those who will attend to the facts which I have detailed with scrupulous exactness in a subsequent part of the work, may easily satisfy their minds of the nature of this fever.

The surrender of the city of Cairo, having again given the French the possession of all lower Egypt, we were able fully to re-establish our hospitals, and to re-organize our staff. I have entered more largely into the details of the means which were used to effect this, in order to explain more clearly the

advantages which the sick and wounded derive from the surgical staff of the army, when it is placed on the military establishment, as in Egypt, and when the particular direction and government of this body belonged exclusively to itself, in conformity to the orders of several days, which vested this authority in the officers who composed the medical staff of the army of the east. Moreover while general Menou had the command of the army, the members of this staff, according to grade, were entitled to the honours and privileges which belonged to military officers. I have spoken of abscess of the liver, as a disease worthy of notice. It rarely occurs in cold climates, and in such climates, the operation by which we evacuate this abscess is seldom successful, while they have generally terminated favourably in Egypt and in South America.

I have made but few additions to the memoirs which are given after the surrender of Cairo.

When noticing the uncommon disease or atrophy of the organs of generation, the cause of which is still unknown to us, I have ventured to say, that the opinion which I have advanced relative to the causes of this disor-

der, may lead the physiologist to extend his researches, and to make such experiments on animals as may enable him to arrive at a knowledge of the deleterious and sympathetick effects, which narcotick substances produce when taken accidentally in spirituous liquors, or in various mixtures.

The diagnostick of sarcocele which I have pointed out, is worthy of being read with care, because modern authors have mistaken this disease, which depends uniformly on an organick alteration of the membranes enveloping the testicles, for the diseases which belong properly to those organs.

Those who possess the valuable work of Doctor Alibert on diseases of the skin, will perhaps read my *memoir on the leprosy*, with interest. From it this author has cited many facts which support his doctrine of the diagnostick of this alarming disease, and the means of curing it. Some experiments which I have made since the first impression of this memoir, have confirmed the efficacy of the remedies that I had used in this disease, and have strengthened me in the opinion that I had entertained relative to the differences between the leprosy and Elephantiasis.

Young army-surgeons may receive instruction from the article *Surgery*, to which are referred some remarkable cases that have been reported in the last edition of the "*medicine operatoire*" of Sabatier. These cases will inform them of the fortunate results of many delicate and difficult operations, which were performed according to a practice introduced by myself, or on a plan which I had improved. The diseases which made these operations necessary, are remarkable for the uncommon phenomena that attended and the causes which produced them. The principles by which I was governed, are detailed in many parts of this work.

They will also find in this campaign, a description and drawing of the flying *ambulance* suited for the climate of Egypt and all sandy countries: it cost much labour to bring it to the perfection which it had attained at the last battle of Aboukir. To the division which treats of the medicines and customs of the Egyptians, I have added some extracts from a part of my journal relative to their manner of curing diseases, and to natural history.

I have concluded these Campaigns by an extract of a letter which I received, a short

time since, from an officer of talents, who was also one of my companions in Egypt. This letter contained a topographical description of the coasts of Africa, their climate, and the endemick diseases which appear there at different seasons of the year. The similarity in many remarkable points, between this country and the regions which are watered by the Nile, appear to be worthy the attention of the physician.

The concise history of the campaigns at Boulogne, on the sea-coast, at Ulm, and at Austerlitz, forms another part of the second volume.

I have spoken of the epidemick which appeared at Brunn, after the battle of Austerlitz, merely with a view to notice its complication with the wounds which our soldiers received in this memorable engagement. In my memoir will be found some opinions which are perhaps new, relative to the character assumed by this disease, when it affected different nervous systems, its duration, and its consequences. Since the publication of this memoir, I have read the work of Dr. Hufeland, translated by Dr. Vaidy of the army, on an epidemick of this species; and I feel gratified, that I have, on many points, formed

opinions which are in unison with those of this celebrated German author.

At the termination and under the title of this last campaign I have placed some cases and observations, collected during my stay in Paris, after my return from Austerlitz. To these I have also added many facts which preceded or followed this period, because they were allied to the former in their nature. This reason I hope will be my apology for having committed these anachronisms.

These notices relate to some diseases which were extremely acute and on which medicine acted imperfectly. Yet when they are discovered in their forming state, they may be treated with success by the means which are suited to resist their causes.

I have concluded the second volume by the Memoir on Amputations, which I have endeavoured to make as concise as possible, by omitting some details to be found elsewhere in my inaugural dissertation.*

I invite young surgeons to give an unprejudiced and careful examination to the article on "*Practical Surgery*" and my remarks on the inconveniences of immediate reunion, or

* See the collection of theses of the school of Paris 4to. No.1.

healing a stump by the first intention, after primitive or consecutive amputation. This opinion is founded on an experience of twenty-five years' practice, and on a number of observations that I have made among different nations, where this plan has been more or less extolled. Besides, I feel gratified, that I am supported in this opinion, which I have long entertained,* by professour Pelletan, one of the most distinguished members of the ancient royal academy of surgery.†

The third volume begins with the campaigns in Russia and Poland. At the conclusion of some remarks on administrative surgery and the means of preserving the health of armies, and after a notice of the asphyxia produced by the carbonick gas of the stoves at Berlin and in many cities of Poland, I have briefly reported all that related to the medical department, both before and after the celebrated battle of Eylau. The exertions and fortitude of the surgeons, on this occasion, should be duly appreciated, since the most rigorous cold did not deter us from operating and dressing the wounded on the field

* See my surgical account of the army of the east.

† See the "Clinical Surgery," of this celebrated practitioner.

of battle. Their speedy recovery taught us the advantages which result from keeping the wounded separate, while detained in unhealthful situations.

A memoir on "*Gangrene from Frost*," which is introduced after the battle of Eylau, contains some new opinions of the manner in which the causes of this gangrene act, and of their effects; also several remarks on the topography of Prussian Poland; on some particular diseases which prevailed in camp, during our stay in the interiour of this country; on the means which were adopted to arrest an epidemick which appeared among the cattle of the army, and finally, a memoir on the "*Plica*," to which I have thought proper to add the opinion expressed by the Institute, relative to my work, in order to direct the attention of physicians to the principles contained in it.

Such are the principal subjects which relate to the science of physick, in the campaign of Poland.

The second part of the third volume is occupied by the first campaign in Spain. I there present a sketch of the first military operations in that country, some notes which treat of the topography and natural history

of the two Castiles, and some remarks on the physical constitution of the Castilians, their character, and manners. The capitol of Spain is then entitled to our remarks, both on account of the diseases which prevail in it, and its peculiar climate. The bilious rheumatick colick, called *colick of Madrid*, is common here. I have attended, with care, to a number of the French who laboured under it, and experience has confirmed the opinion which I always entertained, that this disease is not caused, as some of the physicians of Madrid believe, by metallick substances. In order to convince those who have not witnessed the progress of this colick, I have thought proper to include in the memoir which treats of this disease, all the details necessary to point out its real causes. While engaged in investigating these causes, I have discovered those of another very acute disorder, that appears with uncommon symptoms. This affection, which I have designated by the name of *soporose ataxy* is the subject of a memoir.

These two memoirs are preceded by an essay on *gangrene from wounds*, where is discussed the application of a new rule, relative to the amputation of a limb, which, in consequence of an injury, becomes gangrenous.—

To this I wish to draw the attention of all army-surgeons. Indeed on the just application of this rule, depends the life of the wounded. The favourable moment for amputation should be improved, without waiting, as most surgeons advise, until the gangrene shall be arrested. In these difficult cases, a military surgeon should be endowed with such firmness of mind, and such resolution, as to resort to this last resource. The principles of this memoir are founded on a great number of authentick observations.

In the course of the second campaign in Spain, will be found reflections on many important cases of surgery, and in particular, on sutures of the face, which may prove useful. This point of doctrine, will perhaps merit a more ample discussion.

The third part of the third volume presents the principal results of the campaign of Austria. These will satisfactorily explain the difficulties which we surmounted in discharging our duties with honour.

Many cases which occurred in this campaign, I may venture to say, will add to the progress of military surgery, and should inspire the professours of the art with great confidence in certain nice operations that

were conducted in a manner new or unusual; and in the adoption of certain energetick means, which may appear cruel to the vulgar, but are necessary to prevent those, whose wounds have even promised well, from expiring in agony.

The events of this campaign will teach army-surgeons, under any circumstances, and in any situation, how to supply the hospitals with such articles as may be required: moreover, it is proper on this occasion, to represent the condition of our wounded in the island of Lobau, and the means by which we contrived to procure for them, at pleasure, a comfortable broth, made of horse-flesh and seasoned with gun-powder, as a substitute for broth made of meat, which could not be procured. These events will remind young army-surgeons, that they should never go to the field of battle, without taking with them all the instruments and dressings necessary to afford the wounded speedy assistance, even if they should be under the necessity of carrying these articles themselves as we were obliged to do in Egypt and in our first expedition through the deserts.

The dissertation which is given at the end of the campaign in Austria, on the amputa-

tion of some limbs, on tetanus from injuries and wounds, is worthy of an attentive perusal.

The latter part of my work comprehends several memoirs and observations collected at the hospital of the *guard*, during the years 1810 and 1811. The diseases which are the subjects of it, proceeding in almost every instance from wounds received in the latest battles, or from the fatigues and vicissitudes of the war, present some facts both rare and curious.

Such is the general outline of this work, in which I have endeavoured to unite every thing that I thought could contribute to the advancement of military surgery. I must solicit the indulgence of my readers for the imperfections that may be discovered in it. I shall consider myself happy should I receive credit for my attempt to remove the difficulties that impede the progress of young army-surgeons and to offer them a kind of guide to which they may at all times refer.

CAMPAIGNS

AND

MEMOIRS.

VOYAGE TO NORTH AMERICA.

ABOUT the age of thirteen, I left Baudean, near Bagneres-Adour, Upper Pyrenees, (formerly the province Bigorre,) the place of my nativity, to repair to Toulouse, with a view of studying physick under the direction of my uncle Alexis Larrey, first surgeon and physician of the general hospital of that city, and corresponding associate of the royal academy of surgery at Paris.*

After having finished my elementary studies in the college of Esquile, and in the schools of medicine and surgery at Toulouse, I determined to visit the universities, in order to acquire that knowledge which is essential to the profession I had embraced.

I arrived at the metropolis, in August 1787, a few days after the celebrated Louis, perpetual secretary to the academy, had announced that a publick examination would be held for the selection of a certain number of auxiliary surgeons of the navy, for the department of Brest. This proposition was so consonant with my inclination for travelling, that, although I might be obliged to abandon my original design, I did not hesitate to become a candidate, and had the good fortune to obtain one

* Now director of the medical school of Toulouse.

of the proposed appointments. I immediately set out for Brest, where, after further examination, I was to receive my rank. An officer of the auxiliary medical staff of the navy also accompanied me.*

At Brest, the principal officers of the medical staff of the navy, Messrs. Billard, Lapoterie and Duret (all known by their writings and works), received us with cordiality, and examined me a second time, together with other surgeons who had come from Paris. I was appointed chief surgeon of a king's vessel at the age of twenty-one years, contrary to custom, as I had never before been to sea.

In the mean time, Holland (for whose service this fleet had been equipped) having concluded a peace with England, orders were received from the minister to disarm all the ships except those to be sent to our colonies to support the French flag, and protect its commerce in those seas. In consequence of this order, almost all the auxiliary surgeons of the navy were discharged, and I was of the small number of those whom the intendant general and board of health were willing to retain.

Soon after, I embarked as first surgeon on board the frigate *Vigilante*, commanded by the chevalier Saques de Toures. While waiting for the period of our departure, I passed the winter in giving lectures on anatomy and surgery to the young students. I visited the prison of the galley-slaves, the arsenals, the magazines and ship-yards; and I turned my attention to every thing that related to navigation, and to the duties which would devolve on me while on ship-board.

Among the galley-slaves in the prison, I observed Louis Bourbon, a man seventy years of age. He was accommodated in a small apartment, and attended with

* Mr. Lescot, now an apothecary in Paris.

particular care. This old man presented a phenomenon but seldom seen. He could see objects only during the night, and by day he laboured under total blindness;—Thirty-three years of uninterrupted confinement in a subterraneous dungeon had thus changed the functions of the organs of sight. His conversation was uncommonly interesting, while he excited sympathy by the recital of his misfortunes, by his resignation, and by his good humour. He performed on the flute with uncommon excellence, and this instrument was his principal source of amusement. His frequent practice on it had caused the wrist, which rested on the chest, to form a depression in the corresponding ribs, as we found after his death. We also took notice of a second anatomical phenomenon not less uncommon, on opening the dead body of another galley-slave, whose viscera we were surprized to find entirely transposed.* In the thorax the heart was inclined obliquely to the right; and in the abdomen, the liver was on the left, and the spleen on the right. The small extremity of the stomach was also on the left, and the intestines had undergone a corresponding transposition. This subject is preserved in the anatomical museum of the naval school. The inspection of dead bodies, and many experiments which I made with professor Duret, furnished us with other observations not less interesting, which shall be given in another place.

In April 1788, the *Vigilante* was ordered to sail with the first fair wind, and, as surgeon, I directed the supply of medicines, dressings and surgical instruments. I also took care to examine the light articles of diet intended for the sick during the voyage, and to have them properly packed and stowed in a convenient place. Several

* Many authors, and in particular the celebrated Bichat, have reported similar facts.

days elapsed between our embarkation and departure; these I devoted to an examination of the ship, her rigging, management, &c.

Being aware that our vessel was ordered to North America, and in particular to Newfoundland to protect the cod-fishery, I obtained from Dr. Lapoterie, and other officers who had sailed to this country, all the information which they could afford, relative to the nature of its climate, its influence on the health of Europeans, and also of the character of the inhabitants of Newfoundland and its productions. I took notes on the difficulties of the voyage, on the seas and climates which we should traverse to reach our destination. I supplied myself with such books as were best calculated to direct me while on board, and after we should arrive at Newfoundland. I had with me a surgeon's mate and a pupil, both zealous and well informed. I profited by the extensive knowledge of the commander, and of the lieutenant, the chevalier Dutrevoux, who honoured me with their confidence and friendship, and gave me great assistance in the study of the navigation, natural history and geography of the western regions.

The wind was favourable, and we set sail on the third of May, and had prosperous weather until the night of the fifth, when a violent storm arose, which continued twenty-four hours, and injured our sails and masts. During this foul weather I was much distressed with seasickness, which I had before heard of, but had never experienced; they who have never felt it, consider it as a trifling or transitory indisposition, but when an idiosyncrasy renders a person liable to be acted on by the causes which produce it, it is perhaps the most painful disease with which a mariner can be affected; as was the case with myself.

This disease is felt in a greater or less degree by those who go to sea for the first time; but there are some who are scarcely affected by it, or who, after having experienced its first attack, encounter every storm without inconvenience from it. On the contrary there are others, who after several voyages are constantly sick during rough weather, and cannot escape this singular affection. I shall endeavour to explain the causes of this difference when speaking of those which produce sea-sickness: its symptoms are generally known, but I shall attempt an explanation of its phenomena.

As long as the ship keeps its equilibrium, and is steady and regular in its course, it matters not what may be its rapidity, the passenger feels no indisposition. But if the wind impede its progress, or the vessel be tossed on the waves by a squall, the sailor is then subjected to the two principal motions which she undergoes. The first of these motions is called *rolling*, by which the ship is rocked from larboard to starboard with more or less violence. The second motion is called *pitching*, and is produced by the reciprocal elevation and depression of the stem and stern. In the first instance a tyro supposes the vessel is turning over; in the second he fears it will go to the bottom. The senses are disordered by these opposite motions; to this mental cause, which acts not on old mariners, is added a physical: these unnatural motions produce shocks, the effects of which are concentered in the brain, a part of the body most easily acted on by its volume, its softness, and want of elasticity. The particles of this organ, after having undergone a species of concussion, are pressed upon each other, and produce the symptoms which characterize sea-sickness. In proportion as the brain is large and soft in its consistence, so is it liable to the operation of these causes; hence young persons, and those whose brains are most voluminous,

are most frequently the subjects of sea-sickness. They who are of an advanced age, who have the brain of a more firm consistence than young subjects, are less obnoxious to this disease. The inhabitants of the sea-coasts and of cold climates, who have the cerebral mass less developed than those who inhabit warm countries and the interior, are also more accustomed to the vicissitudes of navigation, and consequently are less afflicted with this disease*.

The first effects of this concussion of the brain are sadness and a panick which seizes the individual; the face becomes pale, the eyes are suffused with tears, and the appetite for food is entirely removed. The patient is silent, seeks solitude and repose, reels like one intoxicated, is affected with vertigo, tinnitus aurium, and unpleasant weight of the head: nausea succeeds, and soon after, vomiting, which becomes frequent and painful, and continues almost without intermission until the cause ceases. Vomiting, which is the principal symptom of the disease, is sometimes attended with an effusion of blood, and by convulsive motions. These are without doubt produced by the sympathetick irritation or distress which attacks the pneumo-gastrick nerves (the eighth pair) near the origin of which the effects of the concussion of the brain seem to center: and as they are distributed almost entirely on the stomach, this viscus must receive the first impression of the morbid affection; whence it is communicated by sympathy to all the organs of the thorax and abdomen. Hence result syncope, oppression, suppression of the alvine excretions, and obstinate constipation

* I cannot satisfactorily explain the causes of this difference: but observation teaches us that all animated beings, as well as plants, that are subject to the influence of the winds and vapour which come from the sea, and more especially on coasts exposed to the north, are in general contracted in their growth in whole or in part, and are relatively of inferior size.

of longer or shorter duration. The strength of the patient is sensibly diminished and exhausted. The legs refuse to support the body, and when he attempts to walk he loses his equilibrium, and falls as one who is inebriated, he throws himself into the first corner, and there remains immoveable until the act of vomiting obliges him to change his position. The nutrition of the body is suspended, because nothing can be retained on the stomach; emaciation ensues and increases. The faculties of the mind suffer in common with the organs of animal life, and this change takes place to such a degree, that instead of dreading death, as in the commencement of the disease, their suffering is so intolerable, that they desire it; and as I have seen, attempt to commit suicide.

This disease would doubtless prove fatal, if it were of long duration, but it rarely happens that the causes which produce it continue to act with the same force until the 7th, 8th or 9th day. When the tempest is most violent, it sooner ceases, and the disease disappears with the rough weather. The return of favorable winds or of the trade-winds, removes sea-sickness as by enchantment, and restores the patient to his functions; his strength is soon repaired, and he quickly forgets his distress: but the first contrary winds, more especially if they be violent, reproduce the same symptoms as described, with the exception that in some cases they are much milder—some have no return of them: the organs become by degrees accustomed to such concussions and collisions, and perform their functions with regularity. There are also persons in whom the symptoms are equally as severe in the second and third voyage as in the first. It is difficult to explain all these variations; in every instance the brain is most affected. This is proved by the relief which is afforded by getting into a swinging hammock, and covering the head with a tight bandage. As long as the

person remains in this situation, the sea-sickness is relieved, but immediately returns when he leaves his hammock, and comes in contact with the vessel*.

Although this disease is very distressing, persons seldom die from it, unless other diseases are complicated with it; but they may languish a long time and fall into a marasmus. We know but little of the prophylaxis of this disease, and we know of no remedies which can cure it. The cause must be removed before it can cease. Still it will be less violent and of shorter continuance, if before its attack, to particular personal neatness be added general ablution of the whole body in water, strongly acidulated with vinegar, strict temperance, the use of acid vegetables mixed with diet and drinks, and the moderate use of the pipe. Exposure to cold and moist air during the night should be avoided, nor should the person remain between decks, and in the interior of the ship where there is a nauseous and vitiated atmosphere, which increases the disposition to vomit. The example of old mariners should be followed, who, during their leisure, walk on deck where the air is purest, and where the eyes become accustomed to the motion of the vessel and the waves.

When sea sickness has come on, but little food should be taken, and that should be easy of digestion, and such as will absorb the gastrick fluid (which is now redundant) and give tone to the stomach, as the crust of bread and buiscuit dipped in coffee or good wine; or in vinegar and water or lemonade, when coffee and wine are not agreeable. Tea and light punch are equally useful; but all rich and sweet articles are to be avoided, with soups and all kinds of peas; but little roast meat should be taken, or rice prepared in the Turkish manner; expo-

* We observe that persons who travel in coaches which are badly hung, and with their backs turned towards the horses, are affected with this sickness. The camels of Egypt produce the same effects on those who mount them the first time.

sure to cold should be avoided, and exercise should be taken, and the recreation which musick, &c. can afford: the symptoms of sea-sickness are thus alleviated, and its dangerous consequences obviated.*

After a few days of pleasant weather, we encountered another tempest more violent than the first and of longer continuance, which drove us 200 leagues from the grand bank of Newfoundland, near the Azores. After laying to for three days at the mercy of the waves, we resumed our course towards the banks of Newfoundland, where we intended to stop and fish for cod.

After remaining a short time on the banks, we pursued our voyage to Newfoundland, and soon found ourselves in the latitude of Belle-Isle, near which we sailed. From this island we took twenty-one of twenty-three unfortunate sailors who had been shipwrecked on it; they were pale, disfigured, benumbed with cold, and dying from hunger and thirst. I found that many of them had their fingers and feet frozen; we accommodated them below in the cabin and state-room, where mattresses, &c. were prepared for them. Cold embrocations of camphorated brandy, soup made with slices of meat, and good wine and sugar re-animated them. I afterwards attended to the local gangrenous affection under which the majority of them laboured.

We at length arrived in the bay of *Croc*, in Newfoundland, after a dangerous and distressing passage of fifty-four days. Here also are the principal cod-fisheries, and we remained at this place until the 31st of July following; next day we landed on the coast, and the captain marked out cantonments for the officers, and gave orders

* Dr. Keraudren, medical inspector of the navy, whom I have consulted on this subject, also thinks that in this disease the brain is primarily affected, and that the phenomena which take place, are produced by the influence of this organ.

that the sailors should assist in the construction of the cabins. I had one erected for my sick, and for the shipwrecked sailors who had undergone operations; and I had one built for myself near it, to which was attached a small garden that I cultivated with my own hands. While I remained here, I often visited the fisheries of the Europeans, I stuffed birds and quadrupeds, I hunted, and made frequent excursions to the interior.

The cod-fish which are caught here by the line (seldom with nets) are afterwards embowelled and cleaned by persons who attend to nothing else, some cutting off the head and spreading them out, while others salt and dry them; the tongues and the roe of the cod are prepared separately.

The climate of Newfoundland, although it lies between the 46th and 52d degrees of north latitude, is very cold and moist. When we landed at the end of June, the mountains were covered with snow; we saw it in some places very thick and frozen hard, which led me to believe that it never melted. On these mountains grow forests of pine and fir, of larch and birch. The diminutive size of these trees proves the severity of the cold of this climate; wild pear trees are also found here a few inches in height, the fruit of which does not exceed the size of a pea. All the plants are wild and smaller than in Europe. Among the animals of this country we remarked the white sea bear, much larger and more ferocious than the common brown bear, which is also found here. This animal swims after the fishing boats, more especially when they are small, overturns them with his paws when he can reach them, and masters the fishermen. He often lays waste the fisheries, and it becomes necessary for the men to unite in numbers to resist him.

We also found in this country a kind of large stag, which is called *caribou;* it differs from the common stag

only in its superior dimensions, and in having its horns covered during their growth with a short yellow hair. The caribou sometimes comes near the houses; during the night one of them broke into our sheep-fold, where we had a cow that became pregnant by him. She no doubt produced a mongrel: but I lost the opportunity of ascertaining this fact, because she was carried back to Brest. I was told that the rein-deer of this country are similar to those of Canada. There are no wolves, but the lynx is common. I saw a black fox with a tail tipped with white; its fur is considered valuable. The beaver is also common: while demolishing one of their cabins, I surprized two of their young, one of which I took. The construction of these cabins is extremely curious, and justifies the account which naturalists have given of them.

A species of wild cat is also found in Newfoundland, which like the civet, produces musk. The hares, although larger than the same species in Europe, are grey in summer and white in winter; the edges of their ears are always white. Europeans who reside here assert, that they change their colour without changing their hair. They are more easily taken than those of Europe.

Several birds in this climate present remarkable variations: a species of red partridge, which is very common (*tetra lagopus*, LIN.) differs from that in Europe in being much larger. The circumference of the eyes is ornamented with a fleshy ring of a scarlet colour. The beak is red, and the toes are covered with thick grey silk or hair, down to the nails. These partridges are also red with brown spots in the summer, and white in winter, as I know from observation. It is also said that this change of colour takes place without a change of plumage. The blackbird is also of a reddish brown in summer, and white in winter. This change is no doubt effected in the same manner as in the partridge. These birds

which are almost tame, probably remain concealed a part of the winter in dark holes, where they turn white; or perhaps nature has endowed them with this change in order that they may avoid the pursuit of the fox.* I have also seen here a species of tit-mouse of a whitish grey colour, and as small as the humming-bird of Senegal. They are very numerous, and suffer themselves to be taken with the hand. The harbours and rivers abound with water-fowl of all kinds.

The natives of Newfoundland are of the race of the Esquimaux of Labrador. They seldom visit the coasts frequented by the fishermen; neither do they trade with them, except through some Europeans who have been long established in the unfrequented parts of the island. One day while hunting with one of our officers, I met two of these savages who ran to meet us. The officer who well knew the country, removed the fears that I felt on seeing them and recollecting that they were called *anthropophagi.* They were entirely cloathed in the skins of bears and sea-wolves, a kind of seal (phoca) very common in this latitude. Their dress consisted of a large bonnet made in the shape of a helmet, a cloak very large and short, a kind of large trowsers. and buskins, the soals of which appeared to be made of a thick hide. Under the cloak a long band, also of skin, served for a girdle. They had each a bow, and arrows with sharp points or barbs made of bone.

* Our author appears to be unacquainted with the fact, that white surfaces radiate less heat in a given time, than those which are black. This change of the hair and plumage of many animals of the northern regions to white, during the period of the most intense cold, is a wise provision of nature; thus they are enabled to retain the heat which is generated in their bodies, and to resist the effects of such low degrees of temperature. The experiments on the radiation of heat from surfaces of different colours also accounts for the fact, that the African is able to endure the rays of a vertical sun with less inconvenience than the European, while he is sooner injured by a low temperature.—Tr.

In a kind of knapsack they carried smoked meat and some furs. They were of a moderate height, well made and muscular, and their hair was brown, smooth, and moderately long;—one of them had a dark beard thinly set: the other was young. Their eyes appeared small, sunken, of a malicious aspect, overshadowed by black eye-brows, short and contracted. Their noses straight with wide nostrils, the lips slightly salient, the teeth yellow, and the skin sun-burnt and swarthy. We understood nothing of their language, but they expressed by signs that they wanted to eat and drink; we offered them some brandy, buiscuit and cheese which remained of our provisions; they seized them with avidity, and began to eat: yet they kept a little of the brandy and buiscuit. More generous than I expected, they gave us in exchange some dressed skins. They excel in the art of dressing these skins, and sewing them together for various purposes. They use fish-bones for needles, and fibres of the intestines of animals of different sizes for thread. They appear less fierce than travellers have represented them. I shall say a few words of their dispositions, their customs, and of their medicines. We left them, regretting that we could not converse with them and visit their dwellings.

We were afterwards informed that their habitations are built in the shape of tents, with poles firmly fastened together on the front of a cave, or at the base of a rock. The entrance is protected by a palisade. They kindle a fire in the middle of the hut, and make a bed by laying the skins of animals before the hearth. They subsist chiefly on salt fish and vegetables, and the products of the chase. As a drink, they use a fermented liquor made of the buds of the fir-tree, and during the rigour of winter, they drink whale oil, which considerably increases calorick, and with it they anoint the whole surface of their bodies to strengthen their limbs, and improve their agility.

The Esquimaux are extremely jealous of their wives, and never permit them to go from their cabins. These Indians, as well as the colonists prepare their provisions for the winter, during the fine season, that they may not be obliged to leave their retreat. The climate of Newfoundland, as we have already observed, is very cold in the winter, and moist in the spring, from the thaws and continual fogs which prevail during the first months of this season on the coast, and particularly on the coast of the Grand Bank.

Our sailors who were engaged in the cod-fishery, were now attacked by the scurvy, and a great part of the crew were also seized with catarrhal affections. We used every means which might guard against all vicissitudes: but when we left Europe, the men had not taken sufficient precaution to resist the humidity and rigorous cold of two different seasons in this latitude. Sailors who are destined for the northern seas, should be always supplied with two kinds of cloathing, one of fur, very warm for winter, and the other light for summer. A change of temperature, the use of the pot-herbs which we had sown and cultivated with success, in addition to those which were indigenous, fresh bread, and the exercise of hunting and fishing, soon removed these diseases. The head of the cod, cooked with the above vegetables, made a delicious broth, and an excellent antiscorbutick.

In the month of July, the wind blew uniformly from N. N. E. and the weather became fine and warm. The heat elevated our thermometer, in the valleys and harbours, at the latter end of this month, to the 27th and 28th degrees above Zero.* When the sun is in the tropick, day immediately succeeds night without the intervention of twilight. I have often returned from hunting at eleven

* The thermometer of Reaumur was that used by our author.—Tr.

o'clock or at midnight, under the opinion that it was but seven or eight o'clock in the evening.

Notwithstanding the severity of the frost, and the great quantity of snow which remains during the winter, (and from what we saw we judged it to be five or six feet deep), the numerous forests of Newfoundland are filled with birds and insects: a species of gnat, called *musquito*, is very troublesome, and produces by its sting, local inflammation and fever, which are but ephemeral. The effects of these stings were removed by washing with salt water, and by rest and refreshment. By my advice our men protected their skin from them, by anointing themselves with oil slightly camphorated, and by wearing a veil of gauze over the face. We often saw in the harbours of Newfoundland, those dazzling lights which appear during the nights, and in particular when the weather is warm about the oars and the wake of vessels. The observations which I have made lead me to believe, that these lights are the result of the presence of a large quantity of phosphorick animalculæ, and putrid animal matter mingled with the water. The situation where these lights appear most brilliant, are consequently unwholesome, if persons continue long in them.

We left Croc on the 31st July, to reconnoitre the northern part of the island; we anchored in the bay of the Canaries where a cataract falls more than sixty feet: we there caught a large quantity of salmon, the smallest of which weighed 15lbs. Hence we passed to White Bay, and sailed into the icy sea, as far as the bay of Orange, on the coast of Labrador, between the 55th and 56th degrees of north latitude. We had intended to return through the straights of Belle-Isle in order to visit the bay of St. Lawrence, but the ice and rough weather obliged us to stop in the bay of Croc, where we lay several days. Our dwellings were in the same state as

when we left them, and I must confess that I quitted this solitude with some regret. From Croc we sailed to St. John's, an English colony advantageously situated to the south-east of Newfoundland;—the entrance of the harbour is defended by a tower mounted with cannon. After remaining here a short time, we directed our course to St. Pierre de Maquelon, a French colony which we wished to see. It is situated on the south-east extremity of Newfoundland. On the second day we were driven by the currents and a furious tempest, more than 200 leagues from the place of our destination, on the coast of New England. After laying to three days, a favourable wind succeeded this hurricane, and we steered to St. Pierre, where we arrived the 23d Sept. 1788. The harbour and the little town of this name are much like those of St. John's. After encountering in this harbour one of the most violent hurricanes that I ever witnessed, and with difficulty saving the ship from destruction, we set sail for France on the 27th of September. After experiencing contrary winds, and being reduced to the shortest allowance, we cast anchor at Brest on the 31st October, 1788.

During a voyage of six months we lost none of our crew but the second mate and a marine, who were lost in the road of St. Pierre. But about twenty-four of them were on the sick-list during this period, besides the shipwrecked sailors that we took off Belle-Isle. At least half of them were attacked by the scurvy with different degrees of violence; some were dangerously ill; others laboured under putrid, nervous, malignant and eruptive fevers—of the last was a confluent small pox of a malignant character. The remainder had catarrhal affections, diseases of the stomach, rheumatism, syphiles and ophthalmia. The suitable drugs which I had on board, light and refreshing aliment, good broth, generous wine and fresh

bread contributed largely, with the zeal of my associates, to the cure of these diseases. I amputated the toes and feet of many of those who were shipwrecked, which had been sphacelated by cold, and I also performed many other delicate operations.

Cleanliness of the ship, fumigations of nitre and sulphur, the circulation of the air by means of a ventilator; a daily muster of the crew at my request, frequent ablutions with water and vinegar, constant exercise, except during the hours appropriated for repose; good nourishment, and drinks mixed with vinegar and brandy were the means which I used to secure the health of the crew, and to restore the convalescents.

The frigate was laid up on our return to port; and I procured a furlough and returned to Paris.

CAMPAIGN OF THE RHINE.

FROM the period of my return to Paris, at the commencement of the memorable winter of 1789, to that of my first campaign in the countries bordering on Germany, many remarkable events transpired in this capitol, to which I was a witness. I shall confine myself to a succinct account of those connected with the healing art.

The first storms of the revolution were followed by violent commotions in the suburb Saint-Anthony; an insurrection took place among the workmen of the manufacturer Reveillon, and a sanguinary contest ensued, between them, a party of the inhabitants of the suburb, and two regiments of cavalry which had been sent there to restore order. In this conflict a great number were wounded on both sides, but principally on that of the inhabitants, of whom a part were transported to the Hotel Dieu, where I attended a course of clinical surgery under M. Desault, who practised with so much zeal and success. The illustrious practitioner embraced this occasion to give us the result of his experience on several points of military surgery.

1st. It was the custom to use spirits in the dressing of all gun-shot wounds. Desault taught us that their use was pernicious, and that it was necessary to return to the emollients, recommended and used by Ambroise Pare: vegeto-mineral water had also been used.*

* Solution of acetate of lead in water.—Tr.

2dly. Desault likewise taught us, by examples, that extensive incision of these wounds produced muscular hernia.

3dly. It was a prevalent opinion that incisions changed the nature of gun-shot wounds. Desault taught us, that in order to change the nature of wounds, from a complicated to a simple state, it was not sufficient to make the part bleed: that in order to attain this end, it was necessary to remove the bruised edges with a sharp knife, and then to unite the wound with a suture; and that this method is practicable only in wounds of the face, and in solutions of continuity of the soft parietes of the mouth. In my campaigns in Germany and Egypt, I have profitted by the practical lessons of this man of genius, who appears to have here made one of the most important discoveries in surgery.

4thly. Prejudiced in favour of Faure's opinion as to the proper time of performing amputations after gun-shot wounds, Desault did *not* obtain in those which he undertook, all the success that he expected. Some of his amputated patients died of tetanus, and in a few cases the cure remained a long time indecisive.

Our intestine divisions were the source of several combats: such as those which took place in the garden of the Thuilleries, at the Bastile, and the Champ de Mars, which produced wounds of every description.

Being in the service of the royal hospital for invalids, at the time that martial law was proclaimed in the Champ de Mars, I received a number of the unfortunate men wounded on that day. Among them many cases of fractured legs from gun-shot wounds, taught me to appreciate the valuable precepts given me by my illustrious master Sabatier, first surgeon of this hotel, and by Billard, first surgeon of the naval armament at Brest.

I had an opportunity of making many important observations on various disorders, and especially on the scurvy, of which I shall speak in the sequel of this work.

In one of the intervals of these events, I was called to the assistance of the wife of a butcher, named Lenormand, who was attacked by a carbuncle, or malignant tumour. This malady, which had alarmed all the persons in the neighbourhood, had already carried off two of his family. I shall describe in another place the character of this malignant tumour; I shall content myself at present with reciting the case, mentioned in the *Gazette de Sante.*

On the 13th of May, 1789, an ox having a carbuncle, was accidentally purchased, at the market de Monte Rouge, by M. Lenormand, butcher, who, having perceived the tumour, without being aware of its nature, hastened to kill the animal, lest he should lose the sale of his beef. One of his boys, about seventeen years old, having killed the ox, was seized, while in the act of flaying it, with a violent syncope. Soon after he was taken with a head-ach, vertigo, and a stiffness of the left jaw, where a blackish pustule appeared, which did not immediately attract the attention of the patient. However, he complained of pain, and obstruction in all the adjacent parts; of great heat, and of purplish redness in the circumference of the tumour, which was black and depressed in the centre. A surgeon was called; he applied emollient cataplasms; he let blood twice; prescribed the use of cooling drinks, and the baths. The disorder was so rapid in its progress, that the patient died on the 21st of the same month. Half of his face was already gangrenous. A second boy met with the same fate. The tumour made its appearance on the neck, and was attended with the same symptoms as the preceding. The sudden death of these two individuals, from a tumour of the same character and virulence as that which had attacked

the butcher's wife, alarmed the attendants and physicians to such a degree, as to make them afraid of the contagion; and they deserted her. The heat and moisture of the season might perhaps have favoured the progress of this disease, and given it a contagious character. The rigorous winter had also deprived these poor people of the means which might have preserved them from this disease.

Lenormand's wife had already undergone the treatment above detailed, when I was called. The danger was imminent: the carbuncle had commenced, as in the case of the first boy, upon the left jaw, near its angle. The tumour was gangrenous in the centre, with redness and tumefaction at its circumference; accompanied with loss of strength, difficulty of respiration, hiccough, a constant discharge of saliva, nausea, vomiting, and a discolouration of the skin, coldness of the extremities; weak and intermitting pulse, mental aberration; in short every thing announced the approach of death. I prescribed cordial antiseptick drinks, aromatick cataplasms, and mineral lemonade as drink. I directed vinegar to be evaporated in the chamber. Previous to any operation, I held a consultation with M. Boyer, of La Charite.* He concurred with me in opinion, that the gangrened portions of the tumour should be taken out as soon as possible, and a liquid caustick applied to the diseased parts which the knife could not touch. In the course of twenty-four hours after the operation, the symptoms improved, the swelling abated, and the strength of the patient began to return. I joined to the internal remedies bark and good wine. The patient was relieved, and continued convalescent for six weeks, when she was perfectly well. The uniting bandage completed the re-union of the lips of the wound, which took place without a fistula, and with but little deformity.

* Now first surgeon to his majesty the emperour.

Two other butcher's boys had the malignant tumour. I prevented its effects by the treatment which I pursued.

When war was declared, I was appointed by the minister, aid-major, (or surgeon-major of the hospitals) to the army of the Rhine, commanded by marshal Lukner. I repaired to his head-quarters, at Strasburg, on the first of April, 1792. The first weeks were devoted to preparations for the campaign. We employed this leisure time in improving our knowledge,* and in the preparation of dressings. The army was encamped behind the lines of Weissemburg.

I was then charged with the surgical direction of a division, commanded by lieutenant-gen. Kellerman, who, after having made an excursion in the mountains of Limbac, formed a camp of observation under the walls of Phalsburg; he rejoined the body of the army at Weissemburg, and, almost immediately took command of the army as successour to marshal Luckner, who was ordered to the camp of Lunn; Kellerman, being ordered to take post with the army of the Moselle, was replaced by general Biron, and he, soon after, was superseded by lieutenant-general Custine. Under him the campaign opened. During my stay at Phalsburg, I performed some delicate operations with success; among others, that of a hernia, extremely complicated, which is described in the fourth volume of Desault's Surgical Journal.

Already had our advanced guard been attacked on the banks of the Rhine, by the legions of Conde and Mirabeau; general Custine intended to pass this river, and began his march to Spire, in order to effect it, on the 29th of September, 1792. So great was the order and spirit of discipline, which prevailed in this army, of about

* I had formed a medical society, in which every thing relating to military surgery was discussed.

20,000 men, that they appeared in front of this town before their march was known either to the inhabitants or the garrison, which was composed of about 40,500 men. At day-break we surprized the enemy, going through their exercise upon the glacis; they had scarcely time to retreat into the place and to close the gates. Having answered our first summons by some guns, the general ordered an investment of the town, and attacked it immediately. As the assault was about to be made, the enemy offered to capitulate. Their gates, were opened, and our commander entered with his etat-major; but scarcely had he advanced into the principal street, when he was assailed on all sides by musketry, fired from cellars, and the windows of houses. One of his aids-de-camp was killed at his side, and another dangerously wounded. A few discharges of artillery and musketry drove those of the enemy who had not been wounded into a peninsula, on the Rhine, where they were surrounded and made prisoners of war. The general gave up the city to pillage; yet, on the first signal of retreat our soldiers returned to their banners with promptitude.

I now first discovered the inconveniences to which we were subjected in moving our *ambulances*, or military hospitals. The military regulations required that they should always be one league distant from the army. The wounded were left on the field, until after the engagement, and were then collected at a convenient spot, to which the *ambulances* repaired as speedily as possible; but the number of wagons interposed between them and the army, and many other difficulties so retarded their progress, that they never arrived in less than twenty-four or thirty-six hours, so that most of the wounded died for want of assistance. Many were wounded at the capture of Spire, and a great part of them fell victims to this inconvenience. This suggested to me the idea of constructing an *ambu-*

lance in such a manner that it might afford a ready conveyance for the wounded during the battle. I was unable to carry my plan into execution until some time after.

We collected the wounded, whose number amounted to three hundred and sixty, in a large convent, well calculated for a hospital. Among them were some very much injured, who required important operations.

On breaking up the encampment, general Custine directed his army towards Mentz, where we arrived on the 18th of October, after three days' march. A line of circumvallation was drawn round the city, and preparations were made for an assault. The governour and magistrates were summoned to surrender. The third day, a capitulation was offered by the garrison, and accepted by general Custine. The inhabitants advanced to meet us, and we took possession of the town amidst the acclamations of the people, and the sound of martial musick.—Mentz is one of the strongest places in Europe; our principal establishments were made there; and I was charged, as senior assistant-surgeon, with the direction of the medical staff of the army and of the hospitals.

I profitted by this leisure to attend the anatomical labours of Dr. Sœmmering, and to repeat, with Dr. Strak, the first experiments that had been made in galvanism. After many experiments on inferior animals, I wished to make them on the human subject. An accident happened to one of our soldiers which gave me an opportunity.

An artillery-carriage passed over a soldier's leg, and produced an injury of the knee, which required an amputation above it. The limb being removed, I confided the tyeing of the vessels and the dressing to a careful assistant, in order to engage immediately in a galvanick experiment. I first dissected the popliteal nerve, the trunk of which I insulated at its first branches. Having armed

this nerve with a thin leaden plate, and laid bare the belly of the gastrocnemii muscles; I took a piece of silver in each hand, and touched with one piece the leaden plate, and put the other in contact with the muscles, and very strong convulsive motions were produced, which agitated the leg and foot. Dr. Strak repeated the experiment; but the pieces of iron and steel did not produce such obvious phenomena. The effects were singularly increased, when we used a curved silver probe as a conductor, although the animal heat was by this time considerably diminished.*

The result of these experiments led me to believe, that on conveying the galvanick or electrick fluid to the naked subcutaneous filaments of the nerves, that paralyzed limbs might be restored to their natural functions. Before attempting this experiment, I submitted this opinion to the Philomatick Society, at the same time describing my experiment on the amputated leg. The unimportant advantages which have been since derived from galvanism and electricity in the cure of various diseases, have led me to renounce my plan, and the question remains yet undecided.

Previous to my departure from Paris, while at the practical school, I invented a needle of a peculiar construction, for sutures. The success with which I used it in our first campaign in a number of cases, induced me to make it the subject of a short memoir, which I addressed to the Royal Academy of Surgery, who were then discussing a question of long standing, on instruments of this description.

* A great number of extremely curious experiments, analogous to mine, and those of Galvani, may be found in the History of Galvanism, by Dr. Sue, principal physician to the hospital of the guards.

The academy received my memoir favourably, as well as the model of the needle, and decreed me a gold medal of 100 livres value.

The publication of the transactions of this academy having been suspended since the death of its secretary M. Louis, my memoir has not yet been printed. I shall therefore give a short extract from it.

I first attempted to point out the inconveniences of the needles hitherto in use; I then described mine, and explained its advantages. It is made of fine and well-tempered steel; it is necessary to have them of various sizes for different parts. It is curved so as to form a semicircle, with parallel extremities; the point resembles a small lance or piké, slightly curved, and acute with sharp edges. The edges terminate towards the body of the needle in two obtuse angles, more or less salient according to the size of the instrument. Its body is of a uniform thickness and size, polished on both its surfaces. —Its edges are rounded, and rather thinner than the middle.

Its heel is pierced by a square transverse opening, at a short distance from the extremity, and contains a smooth groove for receiving the cord or ribbon. These needles pass easily through the skin, and the ligature or ribbon is perfectly free, retains its flattened form, and thus supports the lips of the wound. The slight wounds occasioned by these needles, are never attended with danger; and when the ribbon is extracted, they quickly cicatrize.

In comparing these needles with those of the ancients and moderns, the difference will be apparent; these pass easily through the thick and elastick membranes of the skin, and produce wounds similar only to those which follow the use of the lancet.

I have frequently used these needles, and always with complete success.*

I also presented to the academy a needle for aneurism. It differs from the first only in the form of the point, which is blunt, thin and rounded, so that it may penetrate the cellular substance with facility, while it cannot wound the nervous cords, nor cut the collateral branches of the arteries which are to be tied. The opening for the reception of the ligature is formed in the same manner as that of the needle for suture. The needle for ligature is made flexible, in order to pass without difficulty in the indirect course it sometimes has to pursue.

General Custine began his march at the end of November, 1792, with a portion of the army, for the purpose of penetrating into Franconia, in order to meet the Prussians on their route to Coblentz. The senate of Frankfort delivered the keys to the general as soon as he appeared before the town. He left a garrison there, and continued his march. Hanneau followed the example of Frankfort, and we experienced no further obstacle until we arrived at Limbourg. Friedburg, Usingen, and Weilburg lying in our route, surrendered at discretion. Koenigstein, a fortress placed in a defile of the mountains on the right bank of the Rhine, surrendered, after a few days' resistance; and we left a garrison there under the command of captain Meunier.

At Limbourg, our advanced guard had a brisk engagement with that of the king of Prussia. The remoteness of our *ambulances* deprived the wounded of the requisite attention. The superior numbers of the enemy obliged Houchard to effect his retreat by night, although he had gained the field of battle. On the other hand, the commander in chief having received intelligence of the sud-

* See the plate of instruments.

den march of a strong column which advanced on the left, prevented this movement by taking an advantageous position between Hœchst and Frankfort. We found it impossible to bring off our wounded, who fell into the power of the enemy. This misfortune induced me to propose to the general, and to the commissary-general, who felt great solicitude for these unfortunate men, the plan of an ambulance, calculated to follow the advanced guard in the same manner as the flying-artillery. My proposition was accepted, and I was authorized to construct a carriage, which I called the *flying-ambulance*. I at first thought of having the wounded conveyed on horses, furnished with paniers; but experience soon convinced me of the insufficiency of this plan. I next thought of a carriage, so suspended, as to unite swiftness to solidity and ease. I shall give a description of this *ambulance* in my campaign in Italy, in the year 1797.

Having completed this new ambulance, I repaired with it, by order of general Custine, to the advanced guard of Houchard, upon the mountains of Oberuchel, near Koenigstein.—They were covered with snow.—Houchard wished to check a column of the enemy in this defile through which they intended to pass. Notwithstanding the rigour of the season, and the difficulty of obtaining provisions, this advanced guard, composed of the first volunteers that Paris had furnished, were resolved to subdue the Austrians, or meet the fate of the Lacedemonians at the straits of Thermopylæ: but the enemy, informed by a deserter of our position, and conducted by some of the inhabitants of the country, surrounded the impregnable post which we occupied, with an army thrice as numerous as ours. Houchard extricated us from this perilous situation by a manœuvre as dexterous as it was unforeseen. He attacked a weak point of the enemy's force, and gained a spot which favoured

his retreat. We had a number killed, and thirty wounded; the latter we carried with us, after having dressed them for the first time on the field of battle.

This precipitate retreat was rendered particularly severe by a fall of sleet, which continued three or four hours without intermission. We were obliged to halt, as it was impossible to march, and suffered much from cold and hunger: we passed half a day in this position, but afterwards reached a village where we met with some relief, and soon rejoined the main army.

The unexpected surrender of Frankfort, where the garrison had been put to the sword, and the superior force of the enemy, obliged us to fall back on Mentz.—Captain Meunier (now general of division), however, retained the fort of Koenigstein, which he defended for six months. Our advanced guard halted on the heights of Cassel, whose fortifications were yet unfinished. We hastened the work, and were soon obliged to entrench ourselves here. We had many sanguinary contests;—among others, that of the 6th January, 1793, when we had new opportunities of appreciating the services of my flying ambulance.

Threatened on all sides by the united armies of the Prussians and Austrians, general Custine made preparations for the defence of Mentz, left a garrison there, and marched with the remainder of the troops for the duchy of Deux Ponts, shaping his course towards Baccarach, where a strong body of the enemy had crossed the Rhine.

I received orders to attend with my flying ambulance. After two days' march, we came up with the enemy, who had possessed himself of the forts and defiles of the mountains of Kreutznach and Stromberg. Custine dispossessed them of these forts and strong positions at the point of the bayonet. The superiority of the enemy in

point of numbers was so great, that we were obliged to relinquish these advantages, and effect a retreat, which was extremely difficult. We were continually obliged to give the enemy battle, in order to cover Mentz, and to give the inhabitants time to supply it with provisions.—This town was soon blockaded, and the remainder of the army obliged to retire to Frankenthal.

The advanced guard took position on the heights of Altzey, to observe the enemy, and the main body pursued its route to Frankenthal. We passed the night on the alert; at day-break our rear guard was attacked by a strong column, to which was soon added a reinforcement that had nearly surrounded us. Fortunately gen. Custine had discovered their march, and came to our assistance with some regiments of light cavalry, and a reinforcement of flying artillery: he was accompanied by the commissary-general Villemansky.

The skilful manœuvres of the advanced guard, commanded by general Houchard, saved us from the snare which the enemy had laid for us. He commenced a vigorous attack, the action became general, and we gained the victory after an obstinate contest. Many of the enemy were left on the field of battle; the rest retreated. Custine charged at the head of the cavalry, and we owed our safety to his courage and address.

I have spoken, in a Memoir on Amputations, of those which I then performed on the field of battle. While the soldiers were employed in flaying the Austrian horses which had fallen in the action, for the purpose of eating their flesh, I was engaged in collecting the wounded, and carrying them to Frankenthal.

Notwithstanding their success, the advanced guard was ordered to continue its retreat to Landau, where it was met by the main body of the army. We took from the intermediate towns all the wounded, and hastened to

reach this place; and after supplying it with provisions and a strong garrison, commanded by generals Lobadere and Delmas, the army pursued its march to the lines of Weissemburg, before which Custine caused new entrenchments to be made.

In these two campaigns I had carefully observed the phenomena attending gun-shot wounds, and perceived the advantage of immediate amputation, when the injury required it.

My success in this mode of practice pointed out the error of Faure and Bilguer, although it had its partisans in the academy of surgery. I made it the subject of a new inquiry, which I endeavoured to resolve. I pursued my researches until I found a sufficient number of facts to support an opinion, when I ventured to promulgate it. It was strongly opposed; but this did not discourage me; it had no other effect than to delay my memoir to the school of medicine, which superseded the academy. It was afterwards sent, and will be found inserted in this work.

In these campaigns, for the purpose of instructing my pupils, I examined the bodies of a number of soldiers, who were supposed to have been killed by the wind of the balls. They exhibited no wounds; I endeavoured to explain the causes which produced death in these cases, without any evidence of external injury. The disorders which I constantly found in the internal organs, left me no room to doubt of the immediate action of this projectile. A detail of the proofs of this fact are included in the above-mentioned memoir.

We had few internal diseases in the army. The good constitutions of the men, together with good regimen and discipline, will account for this. Wholesome food, and above all, exercise, are the best antidotes to disease.

We experienced the truth of this remark in the following campaigns.

Dupont, the chief surgeon, being shut up in Mentz with a part of the administrative etat-major, I was charged with the direction of the surgical staff of the army, from the time of our departure from this town until we arrived in Weissemburg. The consulting surgeon, Lombard, then resumed the direction of it, and I remained with my *ambulance* in the advanced guard. In the mean time general Custine continued to receive reinforcements; he now formed a choice corps, by uniting the grenadiers of every regiment in one body; and completely re-organised the army. A general battle took place in the forest of Candel, on the 17th of May, 1793. Victory was now faithless to us; the two armies separated, and resumed their respective positions. Houchard was ordered to the command of the army of the Moselle; and was succeeded by general Landremont.—Custine was called to the north to re-organize the army which Dumourier had left in a bad condition, and to take the command of it. He was replaced by Beauharnois. This general, wishing to raise the siege of Landau and Mentz, took up his line of march at the head of his troops, and gave the enemy battle on the 20th of July following. No important action took place until the 22d, when a general and bloody battle was fought, which terminated to our advantage; the news of the surrender of Mentz prevented us from profitting by it. On this memorable occasion, the military surgeons received the first authentick testimonials of the satisfaction of the generals and of the government at their conduct. I think it a duty to my companions in surgery, to make the following extract from the report of this glorious battle, addressed by Beauharnois to the convention:

"Among those who so brilliantly served the republick on this day, were, adjutant-generals Bailly, Abbatouchi, of the light artillery, and the surgeon-major Larrey, with his companions of the *flying ambulance*, whose indefatigable attentions to the wounded have contributed essentially to the cause of humanity, and of their country."*

The surrender of Mentz impeded our progress: we took such a position as enabled us to observe the movements of the enemy. Our commander was shortly after recalled to France. Who can contemplate without grief the nature of the triumph prepared for him! The army of the Rhine had to deplore the loss of two generals, who had successively distinguished themselves in command, and every true Frenchman must regret these two illustrious victims of anarchy and faction.

We were now in a frightful situation. After fighting many unfortunate battles, we had nearly fallen by treason, at the lines of Weissemburg. A complete route was the result of an unexpected attack, nor could the army be rallied, until they reached the ramparts of Strasburg. I was in jeopardy, and escaped from the arms of the enemy by miracle, after receiving a slight wound in the left leg.

The enemy not knowing how to profit by his victory, we had time to entrench ourselves, and make new preparations. General Pichegru took command of the army of the Rhine in place of general Carlin, whose existence was of short duration. This army was united, a few days after, to that of the Moselle, and the chief command was confided to general Hoche, who, though young, had already signalized himself. He attacked the entrenchments of the allied army, and, after seventeen days un-

* Vide Bulletin des Lois, and Moniteur, July 27, 1793, No. 208.

interrupted fighting, carried their strong redoubts, raised the siege of Landau, and obliged the enemy to repass the river. Landremont being recalled, general Desaix took command of the advanced guard, to which I remained attached. This corps gained great advantages, and did much injury to the Austrio-Prussian army, which was driven as far as Mentz. The severity of the season rendering it impossible to invest this town, we went into winter-quarters for the first time since the commencement of the war. The Prussians then receded from the coalition, and made a separate peace. The Austrians remained alone, resolved to defend Mentz.

I performed, during this last campaign, some remarkable operations; such as an amputation of the foot, between the tarsal and metatarsal bones, and the extirpation of the head of the humerus, while the arm was saved. I gave a description of these operations, almost all of which were successful, to the board of health.

Our troops had scarcely taken possession of their cantonments, when an adynamick fever made its appearance, and assumed, in a short time, an epidemick character. The winter had been rainy; and the troops had undergone great fatigue, and sustained great privations, and the villages in which they were stationed, were too much crowded. The above causes were more than sufficient to produce an epidemick; it did not, however, extend far, nor were its consequences very serious, because, knowing the principal causes, we struck at the root of the disease. We extended the cantonments into the interior of the country, for the purpose of relieving the inhabitants, and constructed barracks for the advanced guard. We provided better bread, and made daily distribution of potatoes, vinegar, rum and beer. We were furnished with excellent medicines; quinquina was advantageously employed, together with opium.

The successful treatment of this disease, was owing to the zeal and indefatigable attention of the physicians, and especially to the great understanding and constant solicitude of the celebrated Laurenz, physician to this army. To him, and to Percy and Lombard, the soldiers were indebted for the improvements in their encampment and regimen. Many of our physicians and surgeons fell victims to the disease, in their anxiety to preserve the sick.

In the month of April I was sent for to Paris by the generals, and the representatives of the people, to complete the organization of my *ambulance*, and to establish others in the different armies, as their utility and importance had been so conspicuous in the army of the Rhine.

CAMPAIGN IN CORSICA,

THE MARITIME ALPS, AND CATALONIA.

THE organization of a fourth army, which was destined to Corsica, left me no time for the execution of the project, which I had conceived of improving my *ambulance*. Immediately on my arrival at Paris, I received a brevet commission as chief surgeon of the army of Corsica, with orders to repair immediately to Toulon, whence I was to embark for the place of my destination. During my short stay in the metropolis, I fulfilled my former vows, and was united to Miss Charlotte Elizabeth, daughter of M. Laville Leroux, minister of finance, under Louis XVI. I then departed for Toulon, not without regretting the loss of my situation in the army of the Rhine, which I had hoped to resume. I was desirous of passing through Toulouse; and I performed this journey with one of my pupils, in the month of April, 1794. We pursued the course of the canal of Languedoc, as far as Besieres: thence we went to Montpellier. I was detained in that town by many strong motives, especially by my desire of visiting its illustrious university, and paying my respects to its professors. Never shall I forget the flattering reception given me by these distinguished men of learning. The monument, erected in the botanical garden, to the memory of the daughter of the philosopher YOUNG, was an object highly gratifying to my curiosity. From Montpellier we directed our course to

Nimes, where the traveller still admires some monuments of Roman architecture; among others, an amphitheatre, in a good state of preservation.

We passed the Rhone, at Beaucaire, a place celebrated for its annual fairs, and soon arrived at Aix, a town distinguished by the severity of its ancient parliament. Here are fine springs of mineral waters, warm and cold, and some beautiful monuments, and magnificent gardens. Here commence the variegated landscapes of Provence, fertile in olives and vines. We arrived at Marseilles, after crossing a chain of well-cultivated hills. My stay here was very short, as I knew the necessity of repairing speedily to Toulon. The road to Toulon is cut through a chain of elevated barren mountains; and from its topographical situation, and the country which surrounds it, has much resemblance to Marseilles. The dock, or ship-yard, the arsenal, and the magazines, are masterpieces of art. On my arrival in this town, I presented myself to the officers of the army, among the number of whom, was general Bonaparte, commander of the artillery. I entered immediately on duty, and embarked every thing which I might need for the dressing of wounds, either on the passage, or in the island of Corsica. The squadron, which was now ready to sail, was to take in land forces at Nice, the place of our departure. Consequently I received orders to repair thither.

Previous to my departure from Toulon, I had been requested by M. Heurtelop, inspector of the hospitals, to aid him in the performance of his duty in our army, and that which then occupied the Maritime Alps, whose head-quarters were at Nice. We repaired to Nice. After having examined, in his presence, the young surgeons of the army and military hospitals, I was charged with the direction of the surgical staff of the grand hospital for the wounded. I ought in justice to remark, that in this

examination I distinguished young Gouraud, since my pupil and my friend. He justified my expectations, and has risen to the first rank.

All communication with Corsica being cut off by the English cruisers, our expedition was necessarily delayed; the interval I spent with the army of the Maritime Alps, and performed the duties of chief surgeon. I noticed the particular phenomena which many diseases, both internal and external, presented. In my lectures on pathological anatomy, I confirmed a discovery, made about the end of the last century, relative to the effects of submersion; but before reporting the result of my dissections in these cases, I will mention by what means I had the happiness of restoring some drowned persons to life.—These means, being generally known, may succeed in the hands of every one.

As soon as I hear that a person is taken from the water, I hasten to his assistance, and cause him, in the first place, to be gently laid on a mattress, before a large fire; I cut off his clothes immediately, that the body may be exposed to a general treatment. Then, while an assistant makes unremitting and general frictions with warm flannels, I exert myself in blowing with a bellows into one nostril, at the same time closing the other; afterwards I press the thorax and the abdomen alternately; I then pour into the mouth a little warm spirits; I endeavour to irritate the inside of the nostrils and the throat with a feather impregnated with ammoniac. I administer warm enemata of a decoction of tobacco,* and take care to present every part of the body successively

* The injection of the decoction or smoke of tobacco, when used after animation has been suspended by submersion, has, I believe, in no well attested case, been productive of advantage in America. On account of its nauseating effects we should be led to reject its use.—Tr.

to the fire. For six hours I continue these attempts, which appear suited to restore internal warmth and sensibility. Bleeding at the jugular vein, which in this situation always discharges freely, is useful in relieving obstructions of the brain; whereas an emetick is prejudicial, on account of its propelling the blood towards this organ, in the paroxysms of vomiting. Opening the trachea arteria, and electrick shocks produce no benefit.

How is the surgeon transported, to discover motion returning to the lips and eyelids of a man apparently dead, and when he perceives that the heart palpitates, and respiration is restored! It is the rapture of a Pygmalion, when he perceives the marble becoming animated under his fingers! In proportion as the torch of life is relumed, I redouble my exertions, and the patient is at length placed in a warm bed, where he usually remains some days.

Unhappily few drowned men are saved: but it is because life is generally extinct before the physician is called. On opening bodies, I have observed that the immediate cause of death, is the introduction of water instead of air, in the aerial passages; for the lungs are always heavier and produce less crepitus than in their natural state, and are filled, as well as the bronchiæ, with a reddish frothy water; the epiglottis is also raised and pressed against the os hyoides.

I have generally found but little water in the stomach; its vessels are often injected; the intestines are generally full of gas: the substance of the brain is collapsed and softened, and the arteries, as well as the sinusses, full of black, carbonized blood; which proves that besides the mechanical effect on the bronchial system, and subsequently on the heart, there must be a chemical effect, which destroys animal life. It appears, that the carbonization of arterial blood, or rather the passage of black

blood in the system of vessels appropriated to red blood, produces asphyxia, by acting first on the organs of circulation, impairing their functions, and almost immediately afterwards on the nervous substance of the brain; and produces a suspension of the powers of internal or organick life.*

The organ of hearing, participating the two kinds of life, viz. animal and organick, is the last sense which is destroyed. Experiments which we made on living animals, confirmed these facts, and gave us likewise an explanation of the epiphenomena which attend the submersion of persons, and death from drowning. A knowledge of these circumstances being once acquired, the curative means, or those proper to restore animation, are of easy application.†

A disease of a peculiar nature came under our notice, which, by some physicians, was supposed to be of a syphylitick, and by others of a scorbutick character. This was a change of the mucous membrane of the mouth, palate and gums, similar to that which we observed in the grand army, on its return from the campaign of Eylau. Thus, in detailing the epiphenomena and causes of this disease, with which the army of the Maritime Alps was affected on their return from the capture of Saourgio, and other defiles of the mountains, in the beginning of the spring of 1794. I shall give some account of that which proved epidemick in the grand army, on its arrival at the plains of Osterode (Prussian Poland). The individuals affected with this disorder, said, that

* Our author here refers to the doctrines which have been published by Bichat, on the different kinds of life, animal and organick. Vide his Researches.—Tr.

† These methods are detailed in our analysis of the excellent work of the celebrated Portal, on drowning; inserted in the year 1805, in one of the numbers of the *Moniteur*.

they had drunk snow-water instead of river or spring-water, while descending the mountains. This produced colick, diarrhœa, and a degree of heat in the mouth, which they in vain sought to remove by drinking again of the same water, thus aggravating the disease. They soon perceived an excoriation taking place in the gums; aphthous ulcers, in a few days, covered the *parietes* of the mouth; the palate, and sometimes the tongue, was involved in this disease. These ulcers had a chancrous aspect, and whitish appearance; their edges were red and ragged. Those portions of the membrane which escaped ulceration, were discoloured and very irritable; the lips were swollen, and the parts surrounding the mouth more or less enlarged. To these symptoms succeeded diarrhœa, weakness, and a general emaciation.

Antiscorbuticks having been tried without effect, we exhibited mercurial preparations, which served to increase the disease. Repose, good diet, drinks acidulated with vegetable acids, and gargles, with the addition of the muriatick acid, removed the ulcers. The diarrhœa proceeding from the same cause, seldom resisted the use of opium at night, with warm sweet wine, and a few grains of ippecacuanha, which was also sometimes used at the commencement of the disease.

I also think that the stay of these patients in a country, much celebrated for its purity of air, warmth of climate, good water, &c. contributed much to their recovery.

The singular symptoms of this affection, its rapid progress, and its epidemick character, leave the causes of its origin in much uncertainty. The campaign of Poland confirmed the opinion which I had long before entertained of its true cause, which was the snow-water used as drink by our soldiers, in descending the mountains in time of a thaw, where spring-water could not be obtained on account of the immense bodies of snow. This

water, containing a superabundance of oxygen, and deprived, in a great measure, of atmospherick air and calorick, necessarily irritates and benumbs the mucous membranes of the mouth, and the alimentary canal; and far from quenching thirst, increases it. From this soon result a phlogosis in this first cavity, apthæ or ulcerations of a chancrous aspect, and irritation of the mucous membrane of the intestines, and afterwards diarrhœa or dysenterick flux.

As it was probable that the fleet would be detained a long time by blockade, in the gulf of Juan, the land troops encamped on the coast, and the etat-major was established at Nice. In this state of things, my services being of less importance to this army than to others which were then more actively engaged, I voluntarily accepted the invitation of the representatives of the people, Milland and Soubrani, to repair to the army of Eastern Spain, and to undertake the direction of its surgical staff, in lieu of Messrs. Boizot and Benezeck, chief surgeons, both of whom were advanced in years, and infirm.

My departure was hastened by the consideration that I should again see my wife, whom I had left at Toulouse, and my brother, then a surgeon of the first class in the army of Catalonia, whom I had not seen since 1787. I staid a short time at Toulouse, and repaired to head-quarters, which had been transferred from Perpignan to Junquiere, where I arrived in 1794. Many important actions had been fought by this army, and its constant successful operations had conducted it to the first line of the enemy's intrenched camp. The resistance which the Spaniards appeared determined to make within their lines, at the entrance of the plain of Figueres, induced our commander-in-chief to order the greatest and most prompt arrangements for a general attack. I made

preparations for dressing the wounds which might result from the battle that was about to take place on the morrow.

On the 19th November, at day-break, the advanced guards, and their columns attacked the Spaniards; and the battle soon became general. The first line of the enemy was carried at the point of the bayonet; and some formidable redoubts which protected it, were taken by assault: but a sad catastrophe suspended the course of our successes; the enemy blew up two of his redoubts at the moment our soldiers entered. Nothing can be imagined more horrible than this explosion. More than a hundred of our volunteers were on the fortifications when the mines were sprung. They were all blown into the air, together with the wreck of stone bastions, and the artillery which defended them. Many of the victims of this dreadful catastrophe were killed at the instant of the explosion; others by falling on the rocks. All those who were not crushed, or burnt to death, were immediately dressed; of these there were 76. Some were wounded in one or more extremities; others had the whole or a great part of the body scorched; and some were so much bruised or burnt, that they expired a few hours after they had entered the *ambulance*. I was obliged to take off both the thighs of a soldier, who had survived this disaster: besides the sphacelus in his extremities, produced by the total disorganization of the parts, his face, hands, and breast were burnt. Notwithstanding the loss of these limbs, and the enormous burns with which he was covered, this man survived, and was completely cured.

I also cured a second, whose burns were equally severe with the former, and whose right arm and left thigh were amputated.

These two men presented interesting physiological phenomena: they completely recovered their appetite,

and became very fat; but as the extent of the circle of nutrition was much contracted, their alvine evacuations became also more frequent.

I amputated the fore-arm and the leg of a third, whose burns were equally severe with the two first, and with equal success.

A fourth lost both his arms, and yet was perfectly cured.

I had also occasion to perform in this army and with the same success as in that of the Rhine, two extirpations of the arm, at the articulation with the scapula, and one amputation of the foot, between the two rows of the tarsal bones.

Of the injurious effects of cold ammoniated water, vinegar and water, vegeto-mineral water, and of a solution of opium in ice-water, mentioned in some modern works and used by many practitioners for severe burns, I have long been convinced, and I am persuaded, that this description of wounds would not be so frequently attended with fatal consequences, were the treatment of them better understood. I thought it my duty to step out of the common track, in search of a better.—I would advise the dressing of such wounds with safron-coloured cerate, spread on fine linen, previously worn soft; this has the property of mitigating the pain, and preventing irritation by preserving the nervous coverings from contact with the air, and the immediate pressure of the garments.

The use of this cerate is to be continued until the period of suppuration; it may be changed for honey, provided good oil cannot be procured to compose the cerate. Suppuration being once established, in order to support the systaltick force of the subjacent vessels, to promote the separation of the sloughs, and to arrest the progress of putrefaction, I use ointment of styrax. After the sloughing of the eschars, I return to the safron-coloured

cerate, for which I gradually substitute dry lint, with small loose fillets, covered with cerate; and when the grannulations rise above the lips of the wound, I repress them by the application of nitrate of silver. I also use on some occasions, a wash of weak solution of hyperoxygenated muriate of mercury, and sulphate of copper.

I prescribe diluting and antispasmodick drinks, to be taken tepid; such as emulsion of almonds, nitrated and sweetened hydromel, and tisan of rice, &c. I direct the use of light diet for the wounded, such as broths, animal jellies, fresh eggs, porridge, &c. Experience has taught me that soldiers require better diet than persons of a sedentary life; without generous diet, a loss of substance takes place in these wounds, and their cicatrization is tedious. This is contrary to the opinion of Hippocrates, who restricted persons suffering under burns, to low diet. By the above simple treatment, which is slightly tonick and soothing, I have almost always succeeded.

To demonstrate the advantages of our method, over that adopted by most practitioners, it will be sufficient to examine the symptoms of severe burns, whether produced by boiling liquids, or by any inflamed substance applied to a large surface of the body. In the first instance the skin is soft, insensible, and livid, followed by a loss of the epidermis; in the second, which is more frequent, the fire contracts, dries, and scorifies the cuticle, the true skin, and cellular substance, with which it comes in immediate contact; the fluids of the part which is burned, being put in a state of ebullition, are rapidly expanded, and carry to the surrounding parts a great quantity of calorick, the action of which diminishes in proportion to the extent of the surface acted on; the wounded person utters piercing cries, and suffers acute pain, which causes fever, thirst, and loss of sleep. In

both cases the evil is greater than it appears to be, and it is not until some days after the accident that the real extent of the eschar can be determined.

Superficial burns may be dressed either with discutients or emollients; nature is here sufficiently strong to effect a cure; but in severe burns an improper method of treatment is attended with extreme danger. We have seen that the parts affected are completely disorganized, and the others more or less so, in proportion to their distance from the part that has been burned. Discutients, such as iced-water, acids, preparation of lead, or of lime, can only soothe for a moment, and favour the separation of gangrene. Opium is improper both internally and externally; applied to the exteriour, it kills the part instead of bringing on a healthy inflammation; and when taken internally in large quantities, it enfeebles all the organs, after having produced a momentary excitation. If the application of discutients to the wound be continued until the eschars fall off, they irritate the small fibres, and the nervous plexus of the true skin, now deprived of its covering; the pain becomes more acute at each dressing, produces erethism, and disturbs the suppurative process: hence arise convulsions, metastasis, gangrene and death. Many persons who were burned in the unfortunate conflagration of the Austrian ambassadour's house at Paris, in 1810, fell victims to this mode of treatment; while most of those who were treated according to our practice, recovered.

The explosion which had done us so much injury, did not prevent our army from pursuing the enemy into the second line of his intrenchments; and the victory would have been complete, if Dugommier, commander in chief, had not been cut off, in the midst of his successes, by a shell; it passed through the thorax, and lacerated the

principal organs of this cavity. He died on the field of battle before I could afford him any assistance.

An armistice of four-and-twenty hours was agreed on, for the purpose of paying feral honours to this general.—He was buried in the fortress of Bellegarde, with military honours.

In this engagement we had seven hundred wounded, about one-third of them dangerously. I performed the necessary operations, and dressings for almost all these, within the first twelve hours, assisted only by the small number of surgeons who were attached to my *ambulance*. I have detailed the most important cases among them in my dissertation on the ampatation of limbs. Our operations were generally attended with complete success.

The second day after the interment of our general, the attack re-commenced, under the command of general Perignon. The results of the succeeding engagements were more fortunate than the first; the forts and redoubts which protected the entrance to the plain of Figueres, were taken. The Spanish commander in chief, Lannion, was killed in this battle. The fort of this city also surrendered, in which we took nearly ten thousand prisoners, and the remainder of the Spanish army retreated; part of it escaped to the rugged mountains of Barcelona, and another division took refuge in the port of *Roses*. The munitions of war, and the provisions found in the fort of Figueres, were immense; there was a great number of cattle of all kinds. The hospital stores were superiour to any I had ever met with; the linen for dressings was like cambrick, and the lint was as fine as *byssus*, a kind of silk produced by the marine pine, and formerly in great demand for the fabrication of mantles for the Roman emperours. This lint was tied up in small packages, with taste of different colours, by the queen of Spain,

and the ladies of her court. The fortress of Figueres is said to be one of the *chef-d'œuvres* of Vauban.

After attending to the wounded, and establishing hospitals in the town for their reception, I took the direction of those *ambulances* destined for the siege of *Roses*. My place at head-quarters, in Figueres, was supplied by M. Lagresie, one of the chief surgeons of the army, and a man of distinguished talents. I made the town of Palau the general rendezvous of my *ambulances*, as it was nearer than any other to the line of circumvallation drawn round *Roses*, and I placed two subdivisions at the two principal points of the entrenchments.

The siege of this town was continued during the whole winter of 1795, and was attended with almost as much hardship as that of 1789. The thermometer fell to 13 degrees, and the cold was for some days so intense, that our sentinels, as well as those of the enemy were found dead at their posts, and many of the other soldiers had their feet frozen. I shall have occasion, in my account of the campaign in Poland, to speak of the phenomena of this congelation, and I shall then endeavour to explain the causes which produce it.

The siege of *Roses* was very difficult, on account of its advantageous position;—defended on the east by the sea, on the west by deep trenches and swamps, and on the north-east by a chain of rugged mountains, covered with snow. The Spanish squadron, lying in the road, rendered the approach to the town still more difficult; we surmounted all these obstacles, profitting by the darkness of the night to carry on our work; we cut a winding path across the mountains, on which we placed some pieces of artillery; this important post was commanded by gen. Victor.* We likewise erected other batteries on the

* Now marshal of the empire, and duke of Belluno.

heights, which contributed much to the success of the siege. The trenches and marshes which protected the western side, were soon frozen over, and we were thus enabled to reach the third parallel, whence we could batter in breach. As the assault was about to take place, the Spanish garrison, under cover of the night and some batteries which remained, embarked, and escaped, with the exception of 100 men. The next day we entered *Roses*, through the breach. The city had been burnt to ashes; the fortifications were nearly demolished, and we found the shore and the trenches strewed with dead bodies. Never did a strong town make a more determined resistance. The frequent sorties of the garrison, and working at the trenches, cost us many men, and we had a proportionate number wounded, about one half of them very severely. In this siege I again observed the effects of balls, or other circular bodies, violently propelled by gun-powder. I pointed them out to Mr. Antony Dubois, the inspector of the medical staff of the armies, while visiting our hospitals in this capacity. He was also a witness of the advantages of amputation, performed immediately after an accident. Some of these cases are given in my memoir on amputations. M. Dubois shared, for some days, our dangers, our labours, and the privations to which we were obliged to submit, especially at the termination of the siege, when the thaw, and the sudden descent of the mountain-torrents, interrupted our communication with the head-quarters, and other parts of Catalonia.

After the capture of Roses, the enemy sent deputies to make propositions for peace. During the negociation, the army encamped near Figueres. Scarcely had I returned to this town, when I received orders from the committee of publick safety, to repair to my former post at Toulon, to join the Mediterranean expedition, which was then

fitting out anew. As soon as peace was concluded with Spain, I left the army of the Pyrenees, and repaired to the place of my destination. As it seemed probable that the expedition would not be ready to sail for a long time, I obtained permission to return to Paris for the recovery of my health, and to visit my family. This was in 1796. As political circumstances, joined to a scarcity of bread, were unfavourable to my stay in this city, I could not enjoy the furlough which had been granted me. I thought proper to undertake the direction of the *ambulances* attached to the troops sent to re-establish order in the suburb *St. Antoine*.

The storms of popular fury were soon dissipated without any accident, and tranquillity was again restored to Paris. I now hoped to be able to profit by it, when I received orders to repair a third time, to Toulon.

The departure of the expedition for Corsica having been indefinitely postponed, at the solicitation of many naval and military surgeons, I commenced a course of anatomy, and of theoretical and clinical surgery. The emulation of the pupils who attended this course, contributed to its celebrity. Each lecture on physiological anatomy was followed by corresponding experiments on living animals; and all the dead subjects of the naval and military hospitals, were reserved for dissections and anatomical preparations. My pupil Gouraud rejoined me at Toulon, and assisted me in my labours.

Being entrusted also with the surgical direction of the hospitals of this town, I had opportunities of witnessing many acute diseases, accompanied by symptoms and phenomena of a very peculiar nature. The malignant tumour, which was very frequent in these countries, and which may be regarded as a local disease, was particularly the object of my attention. This tumour, especially when at its height, is similar to the pestilential car-

buncle. I shall publish the memoir which I wrote on the former of these diseases.

My practice in the city and its environs, presented many cases worthy of attention. In several persons complete paralyses of the extremities were cured by moxa, variously applied. Lithotomy was performed on a woman fifty-four years of age, with such success, that the patient recovered in seven days, without incontinence of urine, which is a rare circumstance. I attribute this success to the manner of operating. I avoided the section of the partition which separates the urethra from the vagina; opening that canal on the sides, according to the manner of Louis, with this difference, that I used the bistouri and grooved staff, instruments of the most simple construction, and easily managed. If the stone be too large to be extracted in this way, as I have found it in one instance, I cut the canal on the upper side, towards the symphasis pubis. I performed this operation with equal success, and with the same instruments, on many persons, both infant and adult.

MEMOIR ON ANTHRAX.

THE malignant tumour differs but little from the carbuncle. The symptoms of each are the same in their nature; but they are more virulent, and of more rapid progress in the carbuncle. The malignant tumour may be regarded as the least dangerous, or as the most simple of those called carbunculous, and the carbuncle as the most malignant. The first, when its progress is slow, and the gangrenous affection of small extent, produces ordinarily, nothing more than a local affection; while the carbuncle, properly so called, is accompanied by a change, more or less observable, in the whole system. This difference exists as to the effects of these two disorders,

both proceeding from the same cause. I shall speak of them again in this work. In the first case it appears that the deleterious principle which engenders tumour, is confined to some parts of the skin, whence it proceeds inwardly; in the carbuncle, on the contrary, it appears that the deleterious principle extends its effects through the whole system, and produces ataxia, which is more or less obvious.

Though the symptoms of this ataxia bear much resemblance to those of the plague, yet the carbuncles which accompany it, differ in their progress. The tumour is developed suddenly in the plague, and very often before the patient discovers any sensations of pain or itching; and its growth is so rapid, that it may arrive at its last stage, before the patient himself perceives it. The pestilential fever, on the contrary, of which the carbuncle is but one of the effects, has a character peculiar to itself, as we shall see in the description of the plague of Egypt.

On account of these varieties, I have thought it necessary to give a description of anthrax, or local carbuncle, which often makes its appearance in Provence, and other southern countries of Europe.

This disorder commences with a disagreeable itching, and shooting pains in the part where the tumour is forming. The part becomes red, and slightly tumefied, which gives the patient an idea of having been stung by an insect. Soon after, one or more yellowish vesicles arise on the spot where the pain is felt, filled with acrid citron-coloured serum. The vessels of the skin are obstructed and swollen, forming a sort of areola, at first reddish, and afterwards livid, and vesicles are produced similar to the first. The obstruction, or swelling of the centre, extends more or less towards the circumference. The vesicles in the centre of the tumour burst, and emit the fluid which they contained. The dermis, which is now

exposed, becomes black, dry and hard, and assumes the appearance of a piece of baked meat. It adheres strongly to the subjacent parts, and becomes depressed, while the areola, of which we have spoken, rises, extends, assumes a more livid colour, and soon becomes gangrenous. During the first period of the disorder, the itching of which the patient complains, is succeeded by painful tension in the part affected, with swelling, and slight throbbing pains, which pass off during the second period.

General uneasiness precedes or accompanies the attack of this tumour. The patient experiences dull pain in the head, vertigo, and sometimes a disposition to vomit; loss of appetite, distressing dreams, and partial delirium. The pulse becomes feeble, and low; respiration is less free than in a healthy state; the quantity of urine is diminished, and the alvine excretions are totally suspended. It is sometimes attended with singultus; the delirium is in proportion to the severity of the carbuncle, or general affection. If this be malignant, the symptoms are sudden, and increase with rapidity; the gangrenous eschar extends from the centre to the circumference; the phlyctænæ round its circumference burst, and emit a red serous fluid, which strikes a black colour with metals; the whole tumour presents a considerable exuberance, deforms the part on which it appears, and impedes the functions not only of the parts in conjunction with it, but also of those more remote. If the vital powers be not sufficiently strong to separate the tumour, and to throw it off from the system by an inflammatory circle, clearly defined, a species of mortification, which may be called dry gangrene, extends itself rapidly in every direction; the absorption of the gangrenous and deleterious principle, which, doubtless, is effected by the lymphaticks, or cellular membrane, impairs the functions; organick life is first impaired; the patient is distressed by frequent

syncope, singultus, and difficulty of respiration, which cause sensible changes in the pulse; the functions of animal life are also attacked in succession; at intervals, languor, vertigo, and a suspension of the mental faculties succeed; death generally follows these symptoms.

In cases of malignant carbuncle, or those which may be characterized as acute, death generally ensues between the third and ninth day. Should the patient survive this period, the crisis may be favourable. In the mild anthrax, the progress of the symptoms is slower. Although, in every instance of this disorder, and in analogous cases, there are symptoms of malignant fever, yet this disease may be considered as idiopathick, and as produced by external causes: but here, as after inoculation with any virus, the general infection soon appears, and the rapidity of its progress, and its effects, are in proportion to the quantity and quality of virus absorbed. The treatment ought to be varied or modified, according to the predominating symptoms.

To the peculiar constitution of the patient are added different causes depending on the climate in which he lives. The partial or general absorption of certain deleterious gazeous effluvia, abounding in marshy countries, in the south of France, are the principal causes of carbuncle. These mephitick exhalations are emitted more abundantly when the first heats of summer open the pores of the earth and decompose the animal and vegetable substances which had fermented gradually during the winter, and the early part of spring. The places most liable to these exhalations are, grave-yards, which are covered with snow, during the winter; the stagnant waters of temporary lakes or pools formed by the dissolution of snow or by winter rains, in which are engendered innumerable reptiles, insects, and fishes.

When the water is absorbed or evaporated, these insects putrify and emit a pernicious effluvia.* It is owing to these causes principally that the plague is endemick in Egypt, and the typhus fever more or less contagious in Poland, &c. If then, an individual predisposed to morbid affection, be exposed, for a considerable length of time, to the action of putrid effluvia, he will be attacked by carbuncle or some other disease of this nature, varying according to the temperature of the climate. The carbuncle will be more or less mild, according to the action of these gasses. If they are imbibed only by a small part of the surface of the body, such, for instance, as the face, the neck, or the hands, the effect may be mild and idiopathick or local; if the deleterious principle be taken in by pulmonary or cutaneous absorption, the affection will be general, and carbuncles, more or less acute, will appear on the body.†

* The decomposition of water and the putrefaction of vegetable matter, which must of necessity have taken place, under the circumstances enumerated by our author, were alone sufficient to produce the disease of which he speaks; a disease which is very similar in its symptoms to the yellow fever of America.

Although many very intelligent physicians support the opinion that the products of animal putrefaction will excite disease, yet facts and observations are against them. Why are not tanners, glue boilers, &c. and other persons who are much occupied in situations where animal putrefaction is generally going on, more obnoxious to disease than they who pursue other occupations? How is it also that the anatomist escapes disease, after breathing many hours an atmosphere which is highly charged with the products of animal putrefaction? If we take an impartial view of the facts which daily present themselves, in opposition to the opinion that deleterious effects are produced by the effluvia from animal putrefaction, we shall find it difficult to resist their force. The question is one of importance to every community, as it involves the interests of many of our most useful manufactures.—Tr.

† There are no facts as yet before us which establish the absorption of noxious gasses by the skin.—Tr.

Domestick animals passing from the warm and salubrious air of the stable into the inquinated atmosphere of swamps, are most obnoxious to carbuncle, which is quickly received from them by the human species. In this way the contagion is generally transmitted. Putrid effluvia are much more active when emanating from quadrupeds than from men, in the same disease and of equal violence, and are received either by contact or absorption: thus we find curriers, butchers, and cooks very obnoxious to it. It is asserted, that the flesh of an infected animal may be eaten without communicating contagion. I think it possible. However, if the flesh lose its contagious qualities by the action of the fire, it may still retain something noxious. For this reason, during my stay in the armies, whenever I observed a contagious disease among the animals intended as provision for the soldiers, I had all that were in the least degree infected killed and interred.

Abstinence, coarse diet, and slovenliness also predispose to carbuncle; for this reason, it is frequently found among the indigent. It seldom attacks infants or old men; the former escape it, because the vital powers being very strong, resist the deleterious principles; the second, because the activity of the absorbent system is diminished, and the nervous system has not sufficient susceptibility to receive morbid impressions.

The degree of danger depends on the nature of the carbuncle, the constitution of the individual, and the climate. The carbuncle, accompanied by symptoms of general affection, is highly dangerous. The deleterious principle, while it disorganizes the carbunculous part, extends its effects throughout all the organs, and soon interrupts their functions: if the condition of the atmosphere or state of the climate predispose to ataxia, this disease then assumes an insidious character, while, with-

out these circumstances, it preserves its usual appearance, and is confined to a particular spot. In the western parts of Europe we seldom see ataxick fever combined with malignant tumour; and in no case has this fever assumed the character of a contagious typhus. We have compared these two diseases, by observing each in its respective climate. The carbuncle which I have met with in Provence, besides its proper character, was generally attended with symptoms of ataxia; and it was necessary to attend, at the same time, to the general affection and to the anthrax. Of whatsoever nature the carbuncle may be, it will be easily cured, if idiopathick, by gentle tonicks, and the application of external remedies;—but if it should present symptoms of general malignity, such as a weak pulse, heat, dry and black tongue, dull pains in the head, delirium, suppression of alvine excretions, dyspnœa, singultus, sighing, and subsultus tendinum, internal remedies must be immediately adopted.—When the symptoms are rapid in their progress, the consequence is sudden death. In all cases tonicks should be used internally; because while they assist nature in separating the eschar, they support the vital powers, and expel through the wound the deleterious principle, before diffused through the system.

The remedies, however, must be varied, according to the character and the period of the disease. Whatever may be its nature, if the physician be called before inflammatory symptoms appear, a vomit may be advantageously administered, in order to clear the *prima via*, to rouze the nervous system, and to give it vigour and energy. This remedy is sometimes sufficient to carry off the disease. If, notwithstanding this, it pursues its ordinary course, and if the first symptoms be inflammatory, diluting drinks, acidulated with mineral acids, such as the nitrick or sulphurick alcohol, camphor, combined

with nitrate of potass, in proportionate quantities, and light antispasmodick anodyne draughts should be administered. Aromatick and slightly camphorated cataplasms may be used as topical applications. If the formation of the malignant tumour appear slow, it should be hastened by the application of dry cupping-glasses. —Bleeding, at this period, is dangerous, as it is in the plague.

When this first period has passed, and the patient is likely to fall into syncope, stimulating tonicks must be joined to the mineral acids; such as quinquina, serpentaria, and arnica; the strength of the dose to be gradually increased. To the antispasmodick potions may be joined acetate of ammonia, and sulphurick ether. In short, at the third stage, when the anthrax is at its height, at the period when nature endeavours to disembarrass herself by a crisis of foreign and deleterious matter, she should be assisted by an incision into the gangrenous eschars, and by cutting out all those which lie within reach of the instrument, without touching the living parts; then the concentrated sulphurick acid should be immediately applied to the incisions, for the purpose of exciting the subjacent capillaries, and to facilitate critical inflammation, and the separation of the remaining gangrenous portions. When the eschars are entirely removed, the ulcers or wounds caused by their sloughing, should be dressed with a simple digestive, or a mixture of wine and honey, &c. In proportion to the abatement of the symptoms, the patient may use light nourishing food, and good wine, and he will soon recover.

Such is an abridged account of the malignant tumour, which we recognized again in the plague of Egypt, with some slight variations. We had, at the military hospital of Toulon, and in the town, a dozen patients affected with this disease, nearly at the same time, in the month

of May. The warmth of the season, which was considerable, had been preceded by abundant rains; a great number of reptiles and animalculæ were found in the trenches and ditches of the town. The soldiers and inhabitants of Toulon chose these places, which are the first to produce the ornaments of spring, as their publick walk. I remarked that all who were affected with carbuncle, supposed themselves stung by insects or reptiles, while sitting on the grass; though the true cause was, doubtless, their having imbibed the insalubrious air.—This disease bore a contagious character similar to the malignant endemick tumour in Provence, and other countries of the south, where the climate is similar. All these patients were cured, except two. The bodies of these two last, which I opened, at the time of their deaths, had the circumference of the anthrax in a gangrenous state, the stomach and intestines were filled with infectious gas, and were also gangrenous in many parts. The epiploon was yellow and withered; all the venous system was filled with black liquid blood. So that in its results, this disease appeared to me very similar to the plague.

The climate on the coast of the Mediterranean, which stretches from Arles to Nice, is in some respects remarkable. The winds from the east, which in other places bring fair weather, are here the forerunners of rain.—The winds from the south-south-west are sometimes so impetuous, as to tear up trees by the roots, and unroof houses. Little snow falls in winter, and it dissolves quickly; the cold is slight, and the spring commences early. At the end of this season all these countries are like delightful and variegated gardens, which renders a residence in them equally agreeable and salutary.

In the midst of these flattering successes in the exercise of my profession at Toulon, as already recapitulated, I received orders from the minister of war to repair to

Paris, in order to occupy one of the professorships in the surgical department of the military school, established at Val-de-Grace, and I repaired to my new destination.

A few days after my arrival at Paris, the military medical school was opened with solemnity, under the presidency of Dr. Coste, medical inspector of the military hospitals. Among the introductory discourses, made by each professour, relative to his respective department, I distinguished those of my respectable colleagues, Messrs. Dufouard and Chayron, and I yet remember the impression made on the assembly, by the traits of eloquence and philosophick truth with which they abounded. The former was professor of surgical jurisprudence, and the latter of internal pathology. I had charge of the anatomical courses and operations. A great number of students attended our lectures, and the rapid proficiency attained by some of them, attested the advantages of this institution.

Besides the theoretick lectures delivered in the amphitheatre of this hospital of instruction, there were clinical lectures given by four professours, two of surgery, and two of medicine. All the acute cases were made the subjects of publick consultations, which were held on Thursdays, by the consent of the patient: then each professour, after having heard a recital of the case, made by the attending physician or surgeon, delivered his opinion with calmness and impartiality. In this manner they were mutually enlightened; and it rarely happened that the disease was not known in its true character, and its indications perfectly fulfilled. If an important operation was to be performed, it was made in the amphitheatre, in presence of the professours and pupils, after an accurate description of all that ought to accompany or follow it. Critical notes of these consultations, with observations on every remarkable disease, were carefully

made and registered, in order that they might be consulted in case of necessity. The anatomical labours and physiological experiments* on certain animals, were noted with the same attention: the examination of dead bodies was attended to with scrupulous exactness.

Lectures on botany and materia medica, on chemistry, and the subjects appertaining to the arts, rendered this new institution complete. We expected here to form an academy, which might gradually, and by continued efforts, replace the ancient academy of surgery, or at least, establish among the military surgeons that spirit of emulation, which should cause them to collect, with zeal and care, all the facts susceptible of contributing to the progress of science, and the cause of humanity: may they at some future day, realize this useful project.

I was just finishing my course of anatomy, when I received from the minister of war, at the request of the commander in chief of the army of Italy, and the commissary general Villemansky, an order to repair thither in order to organize, establish, and take charge of some *flying ambulances*, similar to those that were established by me in the army of the Rhine, in 1793.

* Dr. Desgenettes, my colleague of the physiological department, conducted these experiments.

CAMPAIGN IN ITALY.

THE order of the minister of war being very urgent, I departed on the first of May, 1797. I passed through Lyons, and without stopping there, soon arrived at the bridge of Beauvoisin, one of the ancient limits of France, at which commences the first chain of Alps. The road cut through these mountains, is in many places so narrow as only to admit a single carriage.

Notwithstanding the difficulties of this route, we arrived without accident at the *grotto*, a winding road opened in the highest part of the mountain, 500 toises in length; it crosses one of the highest mountains in the second chain of Alps, and is cut to the depth of sixty feet. It presents on each side a wall of rocks, tolerably uniform. When we reflect on this marvellous work, we cannot sufficiently admire the efforts and the means employed by Charles Emmanuel II., king of Sardinia, for the accomplishment of so fine a passage through such an extent of rugged mountains: it is certainly one of the most useful monuments by which a monarch can perpetuate his name and his glory.

After passing this defile, we entered the valley of Maurienne. The recitals of travellers, and the sad spectacle which is presented on all sides in this valley, induced me to observe attentively its surface and inhabitants. I left the carriage and performed the route on foot. The inhabitants are here buried in the deep and dark defiles of a

lofty chain of mountains, which, during two-thirds of the year are covered with snow. In the warm season, instead of these immense beds of snow, the traveller perceives fir-trees, blackened by thick clouds resting on their tops. He hears the cries of marmots, the howling of wolves, and the growling of bears. The harmonious notes of the nightingale, the tender accents of the amorous dove, are never heard in these sombre and horrible regions.

In no other part of Europe have I met with a people more miserable than the majority of the inhabitants of Maurienne. I have never seen any of so debased a nature, in point of physical powers. Almost all of them are affected with goitre, which deform the face, and render its features hideous. To this deformity is added, in many instances, that of the skull, the diminutive size and extreme thickness of which is peculiarly striking. These unfortunate persons are called *Cretins*. They are deprived of intelligence, and present all the characters of idiotism. These peculiarities appear to proceed from the use of snow-water, the privations to which they are subjected, bad diet, and the unwholesome air which they inspire in their dwellings. Their habitations alone give an idea of the idiotick nature of the people. They are shapeless cabins, rudely put together, and without doors or chimneys. The smoke escapes by an opening in the roof. The roof is covered with large thick slates, placed almost horizontally, one on the top of another, in such a manner, that the snow collects on them during the whole winter, and sometimes crushes these rude piles with its weight, and buries their wretched inhabitants. A hamlet was pointed out to me, half of which had suffered this hard fate.

We hastened to escape from this dreary place, and soon reached Lansenburgh, a village situated at the foot

of Mount Cenis. Impatient to arrive at the place of my destination, I wished immediately to cross this mountain; but the quantity of snow which had fallen, and the impetuous winds which drive the snow with the velocity of a torrent, rendered the passage difficult and dangerous.

Fifteen prisoners of war, with their guard, had been swallowed up in the night by these *avalanches*, or snow-drifts, which caused such an alarm, that nobody would venture to conduct us. We were obliged to remain in the village, and wait a favourable time. The weather became calm in about forty-eight days, and we pursued our course; but this was a deceitful calm, and we were in imminent peril.* At length, after a painful and dangerous passage of eight or nine hours, we arrived at Susa, the first village of Piedmont. From this town to Turin, the road is good.

At Turin every thing wears the appearance of magnificence, worthy of the residence of a king. It is one of the handsomest capitols in Europe. The demolition of its ramparts have contributed to its beauty and salubrity.

On leaving Turin, the traveller enters the delightful plains of Italy. We passed rapidly over that part which separates this town from the ancient capitol of Lombardy. Milan is larger than Turin, but less regular and elegant; the cathedral of the gothick order, is one of the finest monuments of its kind.

I had heard the Hotel Dieu much celebrated, and I paid it a visit. It may justly be ranked with the finest convents of Europe, for its grandeur, elegance of construction, and interior arrangement. Here invalids receive the greatest attention.

Milan contains a great number of palaces and fine houses, with spacious apartments, well calculated to keep up the purity and the circulation of air.

* The passage of this mountain is now rendered safe to travellers.

On my arrival, I learned that preliminaries of peace had been signed, and the French army was retrograding; —a few days afterwards the head-quarters were established at Milan, and the troops took military positions in the Frioul, and in the states of Venice, Mantua and Lombardy. Notwithstanding the armistice, I received orders to prepare my *flying ambulance;* at this time, the commissary general Villemansky invited me to accompany him in an inspection he was about to make, of all parts of the army, for the purpose of organizing the *ambulances* and hospitals; he desired me at the same time, to examine the young surgeons, and in short, to take every measure which I supposed necessary for the amelioration of the staff in my department.

We departed from Milan on the 25th of May, 1797, and followed the line which stretches from this town to the defiles of Carinthia. Our inspection commenced at Lodi, a place remarkable for the passage of the bridge of Adda. After establishing a hospital there, we repaired to Cremona, a city rendered interesting by some fine ancient palaces, and some monuments of the illustrious dead. We established three military hospitals at Cremona, and a fourth at Pizzigitona, and then passed on to Mantua. This city is placed in the midst of an immense lake, and is intersected by the Mincio, which renders access to it very difficult: it is also fortified by a double rampart.

In the palace of the prince is an immense gallery, filled with paintings by Julius Romain, Carrachio, and other masters of the ancient school of Mantua. There is also a gallery of statues and busts, of great beauty.— That of Virgil first claimed my attention; it is a young head, carrying the stamp of genius, mildness, and that gayety which charms, and indicates a perfect harmony of the powers of the mind. With much interest I then

visited the Virgiliale, situated about two miles from the city; a grotto, shaded by rose-laurels and weeping-willows, with a tapestry of wild vines; a stream of limpid water, which meanders at the foot of this grotto, and some ruins of ancient monuments, which are seen in the environs, add to the picturesque effect of this solitary place, in which the Roman bard composed his immortal works.

It is also proper, in this place, to make some remarks on the unwholesome situation of Mantua, and the influence of the climate on the health of the inhabitants.

The summer and fall are the most sickly seasons. In summer, the days are extremely hot, on account of the latitude, and the reflection and refraction of the sun's rays on the immense lake, which surrounds this city, together with the large calcareous stones with which the streets are paved. During the short time we remained there, the thermometer (Reaumur's) varied always between 30 and 31 degrees. To this heat, which is suffocating, when the wind is southerly, succeeds, after sunset, a cool moisture, which becomes more pernicious after the summer solstice, or when the winds change, during the night, from N. to N. W. The mercury then descends to 6, 7, 8, and even 10 degrees. The humidity is so great, that in less than two hours, persons who are so imprudent as to walk in the night air, find their cloths as wet as if they had been plunged in the Mincio. I was surprized to find this imperceptible rain most abundant when the sky is most serene.

Thus the cause of the frequency of the intermittents and catarrhal affections in this city, is apparent. A stranger passing a few days at Mantua, is almost certainly affected by one of these diseases; especially when, unaware of the pernicious influence of the atmosphere, he takes no caution to provide against it. The most im-

portant and best method of doing this is, never to go out at night without wearing a warm cloak. By this means contact with the cold moist air is avoided, and likewise danger from interruption of cutaneous perspiration, which is the principal cause of the endemicks of Mantua.

From this town we went to St. Benedetto, one of the finest and richest convents in Italy. There we established a hospital, which was afterwards used for the reception of the sick from the garrison of Mantua, and of the advanced guard of the army; but this hospital finally became untenable, on account of the effluvia from the surrounding marshes. It was also too much crowded with sick. From St. Benedetto we returned to Mantua, on our way to Verona, an ancient city, large, irregularly built, and divided by the Addige, into two parts, nearly equal in size, one of which belongs to Mantua, and the other to Frioul.

There was already at Verona a large hospital, to which our wounded had been sent a little while before our arrival. We established two others, and departed for Vicence, a small ancient city on the Brenta, remarkable for the number of palaces which it contains, and some monuments built in the time of the Romans.

After leaving Vicence, we passed some fertile and variegated spots, on the borders of the Brenta, and reached Padua almost imperceptibly. During my stay in this town, M. Malacarne, surgeon, and one of the celebrated professours of the university, had the politeness to conduct us through this establishment, and to show us every thing which it contained of an interesting nature. I there contemplated with veneration the marble busts of many celebrated practitioners, and the mausoleums consecrated to Morgagni, Vesalius, Marchetis, &c. I remarked also, in one of the streets near the university, the tomb of

rity of the island on which it is established; and the inhabitants are seldom sick.

Boats, called gondolas, are here the means of conveyance for the rich and poor, and are more or less numerous according to the ability of the proprietor. These boats are alike in form, colour and size, and all the sailors, though belonging to different masters, wear the same livery. Each boat has a chamber large enough to contain from four to six persons: they are ornamented with tapestry; the windows are furnished with blinds and fine curtains; and cushions of black morocco surround the chamber, which may be extended at pleasure, so as to afford a couch for repose.

The manners and customs of the Venetians are entirely different from those of the other cities of Italy. The women are generally fair; they dress in the Greek fashion, with a veil of red or white crape, which covers the face, falls gracefully on the shoulders, and reaches to the hem of the first tunick. They enjoy great liberty, and can, at pleasure, skreen themselves from the gaze of passengers, by means of this veil. They go out by themselves or attended only by their servants.

The inhabitants who are in easy circumstances, rise at two or three in the afternoon, and pass the remainder of the day in their apartments, in a morning dress; then partaking of a slight repast, they dress, and walk to the square St. Marc, or some of the neighbouring islands, where they lounge a short time, and return to dinner, or rather to supper; they next repair to the theatre, where the exhibition commences about nine o'clock, and continues until one in the morning. The theatres are very beautiful: they are constructed and finished interiourly in the usual Italian stile. Each box, as in the Milan theatres, is a separate apartment, entirely distinct from those adjoining, in which may be obtained

whatever refreshments the company desire. Visits of ceremony are generally made after leaving the theatre. The gondolas, lighted within and without, sail so rapidly, that in a few minutes you may pass through the greater part of the city. At the confluence of the canals are gondolas for hire, which are paid for by the hour, in the same manner as our hackney coaches. Visiting continues until five or six in the morning: they then return home to take repose. The coolness of the breezes at this period are favourable to sleep; the apartments are closed in such a manner as totally to exclude the light, and the night is thus prolonged until two or three o'clock in the afternoon of the succeeding day. The excessive heat of the sun is then mitigated by the cool north winds: this delightful time is, as I have already intimated, the commencement of the day to the higher classes of the Venetians. The artists and other workmen, alone, rise with the sun, and finish their labours when he sinks below the horizon.—The workmen whose occupation is noisy, such as braziers, locksmiths, &c. live together in remote quarters of the town, so as not to disturb those who sleep during the day.

The interiour of the apartments are so disposed, as to delight the eye and refresh the atmosphere. The halls are spacious, decorated with columns, marble statues, and paintings in fresco, instead of hangings; ventilators are placed on the west side, to receive the cool air, as in Egypt. The inhabitants are careful to shut the windows very close on the south side, when the *siroco* prevails. This wind, which may be considered as a diminutive of the *khampsyn*, is suffocating, and brings unwholesome exhalations from the canals; therefore they endeavour to avoid its noxious influence by shutting up their houses, and by taking every other possible precaution. Almost all the citizens of Venice, under the ancient government,

held publick employments, or were engaged in commerce. They are, in general, very fond of money; but are notwithstanding, hospitable and polite. A residence in this city is extremely agreeable, except in the seasons when the *siroco* prevails; viz. the first months of spring. Most of the Venetians then retire to their country seats on terra firma. The merchants and workmen only remain in the city, and notwithstanding all their precaution, there is much sickness among them. Their police is very active, and of course preserves good order and cleanliness. There is much room for improvement in the discipline of the troops, both naval and military, of this republick. In short, it cannot be denied, that the Venetians have not degenerated from their ancient and valourous republican sires, whose name alone struck the Ottomans with terrour.

After gratifying my curiosity by examining this interesting city, I established in it two hospitals for the troops of the French garrison; and in virtue of the orders of general Villemansky, I also organized the medical staff of the expedition preparing for Corfu. Previously to the embarkation of the troops, I was obliged to visit and inspect the vessels intended for their transportation; the armament consisted of a few corvettes, and three ships of the line then in the road. My attention was principally confined to the latter. They were *La Victoire*, *La Gloire*, and *L'Eole*. The first, being old and badly constructed, seldom went out of port. However it was supposed she might yet be serviceable, and she was therefore fitted out for this expedition. The other two, carrying each four hundred men, being better constructed, and in better condition, had just arrived from an expedition against the Ionian isles, where they had lost two hundred and fifty men by an epidemick fever. The return of these vessels to Venice had mitigated the

violence of the disease, and considerably diminished its effects; there were, notwithstanding, thirty deaths in the course of a month, while the vessels lay in the road.

The character of this disease was described to me by the remaining patients, and by the surgeon-majors:—it was an eruptive ataxick fever (malignant fever with petechiæ) which became contagious in its third stage, provided the surgeons neglected the precaution of carrying the patients on deck. In many of them, it was combined with a species of vermis or eruption; and then the patient died, according to the report of the surgeons, in five, or at most, nine days. When they survived the fourteenth day, and the eruption was complete, they became convalescent; but a great number of them were again afflicted with the first symptoms, joined to a dysenteriek flux, which carried them off. Frequently, they who escaped death, had a long and painful state of convalescence.

On inspecting these two vessels, I soon discovered the cause of this destructive epidemick. While they lay at anchor in the gulf at Corfu, &c. where the phosphorick lights are very vivid in summer, (as in the canals of Venice) and indicate the unwholesome condition of this place, the vessels had been constantly exposed to the south or *siroco* wind: the summer had been extremely hot, and the winter mild and rainy. In the latter season they had a pernicious custom of keeping the port-holes closed. The soldiers were for a long time subjected to bad regimen; the sailors lived on buiscuit, farinaceous pulse, and bad rum; in short these two vessels were in a very filthy condition. In *La Gloire* this foulness was general; a fetid nauseous odour was perceptible on the gun decks, between decks, and on the quarter-deck. The baggage of the sailors was scattered about, without any regularity. The tarred rubbish of cordage was strewn

over the decks; the sailors' linen was full of vermin; most of the crew were careless and indolent. On board *L'Eole* the filth was abundant in every corner, and the greatest disorder was equally apparent. Between decks, where the sick were generally placed, we discovered three dying men: they were stretched on wretched beds, and there abandoned to their fate.

According to the surgeon's report, these three persons had been two days previous in a state of convalescence, and suffered a relapse; doubtless, because one of their companions, who had died suddenly, was left lying near them.

All these causes necessarily produced the disease, by which, it is true, the common soldiers and sailors were the greatest sufferers. The officers being more commodiously lodged, better fed, and enjoying more of the pure air, had little sickness, and not one of their number had died.

I proposed the following means of stopping the epidemick on board these two vessels, as well as in the hospitals, and preventing its still more dreadful consequences. I insisted that all the sick should be removed from the vessels to the neighbouring hospitals, and that the troops should be disembarked and encamped on shore, in a salubrious place. This measure was necessary for the health of the men, and gave room for the purification of the interiour of the vessels; which was effected in four-and-twenty hours: for this I pursued the following measures:—

1st. I ordered the ships to be scraped outside and inside, and the interiour to be pitched and washed with lime-water; the exteriour was painted, and the decks covered with sand, and scrubbed.

2dly. I made them fumigate the interiour, especially between decks, and the hold, by the process of Guyton

Morveau, viz. by burning small pyramids of sulphur and nitre, on platforms of stone or brick, placed in different parts of them; a method which I used with success during the voyage to North America.

3dly. I ordered them also to wash the bed-furniture in ley, with the hammocks and the sailors' linen, and to provide the latter with new linen clothes for the summer, and cloth for the winter; this regulation was also observed with respect to the troops. Finally, I superintended in person the selection of a stock of provisions: and I took care especially to provide a great deal of light food, and appropriate liquors. These arrangements being completed, the troops re-embarked. I also gave the surgeons such instructions as would contribute to the preservation of the health of the sailors and soldiers. The object of the first rule, being to prevent disease and contagion, contained remarks on health, which I shall not mention here, because I have already published them, in my account of the voyage to America. It enjoined on the surgeons the greatest attention to the preservation of cleanliness in the ship; it also prescribed means of constant exercise for the soldiers and sailors, in order to prevent the effects of idle habits.

The second recommendation laid down rules for stationing surgeons on board the vessels; their duties during the voyage, and at the period of disembarkation; on the distribution of surgical instruments, dressings, medicines, and light food among the different vessels. It is important to persuade surgeons, who are destined to distant ports, not to collect all their material dependance in one ship, on account of the risk of loss or of separation from the other ships. The provisions should be divided in the same manner, and for the same reason.

The expedition set sail in the early part of June, 1797, and arrived at its place of destination in a few days.

We left Venice, and took the road to Treviso, where I staid a short time for the purpose of visiting a hospital, which had been previously established there. We passed hastily to Conegliano, to the port of None, and to Valvazzone: here we formed deposits for *ambulances* intended to remove the wounded. We forded the Tagliamento, a stream often impetuous, but famous on account of the battle fought a short time previous on its banks. We arrived at Udino, the capitol of Frioul, after passing by Codroipo, Passeriano, and Campo Formio, the latter rendered memorable by the treaty of peace, concluded here in August, 1797, between France and Austria.—From Udino, I was sent by the commissary general Villemansky, to Palma Nueva, Gemmona, and Ossopo, to inquire into an epidemick which had broken out among the soldiers and inhabitants of these three places. Workmen were at this time engaged on the fortifications of Palma; the removal of the earth, the swampy soil of this part of the country, together with the filthy state of the town, joined to the circumstance of crowded barracks and hospitals, had all concurred in propagating a putrid nervous fever among the soldiers of the garrison and the inhabitants, which in some instances assumed a contagious character. The young recruits were particularly subject to it. I proposed, as measures conducive to health:

1st. The cleansing the gutturs of the city, in which foul water was permitted long to remain stagnant.

2dly. The removal of the sick from the hospital to that of Udino, and cleansing the apartments with quicklime.

The number of troops was also lessened at the barracks, and the rooms purified. It was difficult to guard the labourers against the ill effects attendant on removing the earth. I succeeded, however, in confining its pernicious consequences to a small extent, by a daily

distribution among the workmen of brandy and vinegar, and by taking precautions to make them wash their heads and hands in fresh water and vinegar.

At Gemmona, an unfortified town, the troops which were in cantonments were crowded into the small houses of artisans and farmers, where they were incommoded by filth, a circumstance which is, unfortunately, almost a necessary consequence of a numerous collection of people in the same place. Besides, the town is situated in a marshy soil, at the foot of a hill; the water is not good; and as there was already a scarcity of articles of provision of the first importance, the addition of our troops necessarily caused great distress. The hospital was crowded, many of the sick died, and many of the inhabitants likewise.

I proposed, in my general report, that the sick should be removed, and the rest of the troops encamped in some place which appeared most favourable;—this was done.

In the fort of Ossopo, situated on an elevated mountain where the air is pure and salubrious, there were few cases of sickness; yet the soldiers of the advanced posts, cantoned in the surrounding villages, were seized with the same disorder as those at Gemmona; I obtained leave to pursue the same measures with respect to them.

After fulfilling the duties attached to my department, I returned to Udino, thence to Milan, and visited Venice a second time, where I witnessed the solemn establishment of the consular republick, a form of government which had but a transient existence.

The satisfactory results of my inspection, of which I gave an account to general Villemansky, induced him to form a board of health at Milan, consisting of the chief officers of the medical staff. The board, of which he was president, entered into an examination of my reports, and my orders to all the surgeons of the army, and hos-

pitals. They discussed and resolved on a train of wise and useful plans, among which were the establishment of *flying ambulances*, and the formation of a school of anatomy and military surgery in each of the principal towns of Italy, where we had troops and hospitals. I was, in particular, charged with the organization and direction of the *flying ambulances*, and of the schools of surgery to be established, from Piavia to Udino, inclusive.

Previous to quitting Milan, in order to perform the duty which was imposed on me, I completed the frame of the *flying ambulance*. This was approved of by the commissary general, and confirmed by the commander in chief. All the persons necessary to this line of *ambulances* formed a legion of about three hundred and forty, comprising officers, sub-officers, and privates. After having constructed the first, I took it to Udino, where by daily practice I taught the manœuvres necessary to manage it. I entrusted the second to an active, zealous, and intelligent surgeon, M. Roussel, who finished his career with honour in Egypt.

The third was under the direction of M. Renoult, another surgeon of the first class, not less active, now surgeon major.

The following is a description of the *ambulance* used in Italy:

FLYING AMBULANCE.

This *ambulance* which may be distinguished by the name of *century*,* was made up of three divisions. The first was at Udino, the second at Padua, and the third at Milan.

Each of these was arranged in the following manner:

* A name lately given them by baron Percy.

One surgeon major of the first class, commanding with two senior surgeon's mates of the second class,

Twelve junior surgeon's mates of the third class, two of them serving as apothecaries,

A lieutenant, steward of division of *ambulance*,

A sub-lieutenant, inspector of police, acting as under steward,

A quarter master general, of the first class of *ambulance*,

Two deputies of the third class of *ambulance*,

A bearer of surgical instruments, with a trumpet,

Twelve soldiers on horseback, as overseers to take care of the wounded; among them a farrier, a saddler, and a boot-maker,

A commissioned serjeant major of the first class,

Two commissioned officers of the second class to precede the *ambulance*,

Three corporals, retained for the performance of various errands,

A lad, with a drum, carrying surgical dressings,

Twenty-five foot soldiers, as overseers to take care of the wounded.

There were twelve light and four heavy carriages to a division.

This number of carriages required:—

A quarter master general as director,

An assistant quarter master,

Two brigadiers, one of whom was a farrier,

A trumpet,

Five soldiers, as guides.

Total number of men attached to each division of *ambulance*, 113.

The whole legion, including the chief surgeon commanding, 340.

The uniform of the surgeons of the *flying ambulance* was made like that of the army surgeons; they carried a small cartouch box of black morocco, slightly ornamented, divided into several compartments, containing a case of portable surgical instruments, some medicines, and articles necessary for affording immediate assistance to the wounded, on the field of battle; they wore a sword with a black leather belt.

The uniforms of the commissioned and non-commissioned officers were of different colours, ornamented according to their grade. The commissioned officers wore epaulets.

The infantry and mounted overseers who were appointed to take care of the wounded, wore a short uniform coat with a red woolen sash which served, in case of necessity, to carry off the wounded. The mounted overseers wore small cloak-riding-coats and the infantry cloaks; the former wore hussar boots, the latter strong shoes and black cloth guetres; their hats were of black felt, ornamented with leather and brass; each mounted overseer carried a black leather cartouch box, containing one or two plates, a tin goblet, and the utensils for dressing the wounds of the horse; they wore a small sabre with a chamois leather belt. The overseers on foot carried, a leather bag divided into several compartments, containing the dressings that were held in reserve by the surgeons.

The uniform of the common soldiers was nearly the same, but more simple, and made of coarser cloth.

The different classes of these soldiers were distinguished by the colour of the cape, as well as the ornaments of the coat.

The trappings of a horse belonging to an officer of the medical staff, were, a French saddle, with a cloth similar in colour to the uniform of the rider, edged with gold

lace, of various extent, according to the grade of the officer. Instead of holsters, for pistols, I supplied them with couriers' bags, which were more useful: they were covered with a holster-cap, edged with lace. A small leather portmanteau was also fixed to the saddle. This portmanteau contained dressings and might be easily opened without loosing the straps which made it fast to the saddle.

The equipment of the mounted overseers was in general similar to that of the other officers, but much inferiour as to the quality of the stuff and the ornaments.

Each division of *ambulance* consisted of twelve light carriages on springs for the transportation of the wounded: they were of two sorts, some with two wheels, others with four.* The former kind were calculated for flat level countries, the others to carry the wounded across the mountains. The frame of the former resembled an elongated cube, curved on the top: it had two small windows on each side, a folding door opened before and behind. The floor of the body was moveable; and on it were placed a hair mattress, and a bolster of the same, covered with leather. This floor moved easily on the two sides of the body, by means of four small rolers; on the sides were four iron handles through which the sashes of the soldiers were passed, while putting the wounded on the sliding floor. These sashes served instead of litters for carrying the wounded; they were dressed on these floors, when the weather did not permit them to be dressed on the ground.

When the army was engaged in rugged mountains, it was indispensably necessary to have mules, or packhorses, with panniers to carry the materials for dressings, with the surgical instruments, medicines, &c.

*Vide plates of this *ambulance*, Nos. II. III. IV and V.

The small carriages, were thirty-two inches wide, and were drawn by two horses. Two patients could conveniently lie at full length in them; to the sides were attached several pockets, to receive bottles or other articles necessary for the sick. These carriages united solidity with lightness and elegance.

The second kind of light carriages, on springs, was a chariot with four wheels; the body of which was larger and longer than those with two wheels, but of a similar form; it was also hung on four springs, and furnished with an immoveable mattress, and the pannels were stuffed a foot in height, like the bodies of the small carriages. The left side of the body opens almost its whole length, by means of two sliding doors, so as to permit the wounded to be laid in a horizontal position. Small windows disposed at proper distances have a good effect in ventilating the carriage. A hand-barrow may be fixed under these carriages for various useful purposes.

The large carriages also have pockets, and behind, a place to carry forage; they were drawn by four horses, and had two drivers. In these carriages four men might lie with their legs slightly contracted.

We had a board of consultation for the three divisions, which was composed of the officers of the medical and surgical departments. The order and march of these *amlances*, and the duties of every one attached to them were laid down by special rules.

They were designed to convey the wounded from the field of battle to the hospitals of the first line.

The legion of *ambulances* was under the immediate command of the chief surgeon of the army and each division under the command of a surgeon-major of the first class.

They were also introduced to carry off the dead for burial. The overseers who marched on foot were espe-

cially charged with this duty under the direction of the inspector of police, who was authorised to require from the inhabitants the labours necessary for this service.

With these *ambulances*,* the most rapid movements of the advanced guard of an army can be followed up, and when necessary, they can separate into a great many divisions, every officer of the medical staff being mounted, and having at command a carriage, a mounted overseer, and every thing necessary for affording the earliest assistance on the field of battle.

The project of the first surgeon of the army of the north, M. Percy, has but a single object; it is a kind of *wurf*, the staff officers attached to it being on horseback, in the same manner as the flying artillerists; it also carries the instruments, and preparations for dressing.

A view of the plate No. VI. will give the reader a sufficient idea of this carriage to enable him to draw a comparison of these two plans and to judge of their respective advantages and disadvantages.

After having organized the *flying ambulances*, and planned with my colleague, the establishment of a school of surgery at Milan, the first that we established in Italy, and in which I gave the first clinical lessons, I left this city under orders to repair to the head-quarters of the advanced guard, commanded by general Bernadotte; I was directed by the commissary general, Villemansky, to undertake a new inspection of the hospitals of the first and second lines; and an examination of the health officers of the regiments; to make inquiries into the prevailing diseases, and especially into the character &c. of a disease among the cattle, which was devastating Venetian Frioul. I remained some days in Cremona and Padua, for the purpose of establishing schools similar to that of

*They are established, on nearly the same basis, in the imperial guard.

Milan; I opened a fourth at Udino, immediately on my arrival in that town. The professours in the three first schools were chosen from among the most intelligent of the candidates, and were remarkable for their zeal and their devotion to science. At Udino, I gave some lectures, on the different branches of physick, and joined to my practical and experimental lectures, some discourses on clinical surgery. The epidemick of cattle then prevailed in this country, and furnished us with a new subject for observation and study.

This disease made great ravages. The stables of a number of villages and hamlets were already quite deserted, and the inhabitants themselves were attacked by it, and in great consternation.

I had formerly cured the epidemick which appeared in different parts of our cantonments; for this reason, the commissary general Villemansky, was induced to order me to examine into the character of this epidemick, and report to him the measures I might think necessary to arrest its progress; this was requisite both for the remaining cattle and for the men, whose health was visibly affected by it.

In order to discover the causes of this disease, I visited the stables, and caused many animals of different ages, which had died of it, to be opened. But in order to have a better opportunity of studying its phenomena and symptoms. I caused ten chosen from different stables, and affected in different degrees, to be put into the stable of a convent, where I had previously established a hospital for the reception of soldiers under my direction. After considering for some time, I tried different modes of treatment, according to the different stages and severity of the disease. I lost all the animals on which the disease had made much progress. I obtained some advantages by employing the means which I shall mention,

in cases where it was commencing, or had made but little progress. This unexpected success attracted the attention of the government of Frioul, and they desired me to prepare simple and methodical instructions by which the inhabitants might be enabled to cure their own cattle. I speedily complied with this request. Previous to mentioning these instructions, which I had translated into the Italian language, I will give the character of this disease, its causes and its consequences.

The disease was at its acme when I arrived at Udino, in 1793. It assumed all the characters of an inflammatory *anthracia* or malignant fever. It commenced by a general heat, which was particularly observable in the horns of the animal, dryness of the nostrils, bristling of the hair, hardness of the skin, and obstinate constipation. The sick animal drooped its head, appeared agitated, the eyes became red and haggard. This fever proceeded from the commencement of the symptoms with more or less rapidity, according to the age of the animal, or its irritability.

After this first stage, the abdomen became inflated, the hair dry and stiff, and easily disengaged by the fingers; the strength failed; the ears became withered and pendant. cutaneous perspiration ceased; the breath grew fetid, respiration difficult, the animal tottered, and if it fell, had not power to rise. Sometimes at this second period, the intestines relaxed spontaneously, for the copious discharge of a black fetid excrement. To this succeeded an almost constant dysenterick flux of blackish, bloody matter, equally fetid; the debility increased, and the animal died. Malignant tumours appeared sometimes on cows, near the udder.

I have frequently caused animals, which died of this disorder, to be opened in my presence, and I have generally found the stomach filled with undigested herbs.

The mucous membrane of the stomach and intestines was inflamed and gangrened in many places. The pituitary membrane also partook of this inflammation. The intestines were inflated and the epiploons decayed.

At the third stage, the disease was highly contagious; in fact, all the cattle in the stable with an infected animal took it, and died. The constant communication between cowherds and shepherds of different farms, between domestick animals, such as dogs, cats, &c. propagated the disease from stable to stable, and from one village to another; and I have observed, on some farms, the oxen, cows, sheep, and fowls all infected.

The whole province of Frioul had been thus infected in a short space of time by this disease. Even the inhabitants of the places in which it was most violent, were subjected to its malignant influence, and this, no doubt, contributed not a little, to the development of the epidemicks formerly mentioned.

A remarkable phenomenon was observed at Mount-Falcone. The whole establishment of an agriculturist, in the neighbourhood of some sulphuro-ferruginous springs, escaped the contagion. This circumstance was remarked by the inhabitants, who attributed to the stable some preservative properties, which were doubtless to be referred to the continual exhalations from the springs and baths, that filled the atmosphere, which the animal breathed, or to the substances impregnating the springs in which they bathed. Perhaps, also, the pastures on the Adriatic, where the epidemick of cattle is seldom seen, are better than those of Frioul.

Professor Graff, counsellor of the royal academy of Munich, reports in his work, on the analysis of the mineral waters of Bavaria, that the epidemick which ravaged this country in the eighteenth century, affected none of the inhabitants of Peters-Brauner, which is surrounded

by springs of warm carbonated sulphurick water. Insects when subjected to the action of these waters, or the gas formed from them, immediately died, while the domestick animals were secured from disease by their influence. He adds, that a circumstance so favourable to the inhabitants of this village did not fail to attract the attention of some intelligent physicians of this country who carefully studied the causes of this surprizing peculiarity; and that on the second appearance of the epidemick, he separated some animals from the rest, and enclosed them within a circle of furnaces, in which was burnt a certain quantity of sulphur and saltpetre. He fumigated the houses and stables with the gas from these articles and succeeded in preserving the health of the inhabitants and their cattle. The information which I received and the inquiries which I made, satisfied me, that the principal causes of this epidemick were, the bad quality of the forage, the swampy state of the pasture ground, and excessive and long continued heats, succeeding to a cold rainy spring.

The disease was first observed in the black cattle which were put into this swampy pasturage, and soon extended into the interiour of Frioul, while it disappeared along the borders of the Adriatic, where the sea breezes conveyed vapours which held mineral substances in solution. The mortality was very great, and the disease began even to affect the inhabitants themselves. Its malignity so terrified them that they were deterred from applying any remedy to their cattle, and thus the evil was prolonged.

It was at this critical period, that I undertook to explain to the inhabitants of Frioul, the nature of the scourge then desolating their country, and to state to them the means of preservation from, or cure of it; which rules were read by the commissary general, and

published in the year 1797. I shall repeat them in substance.

In a short advertisement, prefatory to my instructions, I commenced by pointing out the character and different stages of this epidemick; I next advised, that when the disease should be far advanced, or very severe, that they should abstain from a treatment, often fruitless, and always uncertain; and that the skins should not be taken off, nor the flesh eaten, if the animal died of the disease, or was killed during its progress. Other domestick animals were not permitted to eat it; for such food is injurious, according to the opinion of physicians, and many examples prove that it quickly communicates contagion. I also recommended, that the animal that died should be speedily interred, without flaying, and covered with quicklime. After this short preamble, I detailed the manner of treatment in the following terms:

If, at the commencement, the disease be attended with symptoms of plethora, and the animal be robust, he should be bled in the jugular vein: this should be done at the commencement of inflammation; if it be delayed, serious consequences may ensue. To this should succeed scarification of the gums and palate; in most cases this local bleeding is sufficient. Costiveness being one of the first symptoms of this disease, after the bleeding, if it be thought necessary, the bowels or rectum must be opened. It is important that the individual performing this operation should have no wounds on his hands, or he will thus be exposed to the reception of contagious miasmata. Care should be taken to wash the hands with strong vinegar, immediately after the operation. Emollient and camphorated glysters should be administered to the animal; cooling mucilaginous and nitrated drinks should be given it: the whole body should

be frequently washed with warm water and vinegar, and then covered with a woolen cloth.

After employing these means, the horns of the animal should be bored in several places near their base: the instrument should be inserted sufficiently deep to penetrate the cellular cavity, from which will then issue the fluids that obstruct the *sinus frontalis*, this cavity being only a prolongation of these sinusses. This operation has an influence on the brain, and revives the animal powers.

Cooling medicines and diluting drinks have been recommended in the first stages of the disease, but these must not prevent the use of a seton. I used in this operation, a sharp flat iron, with acute edges and an ebony handle, tolerably thick. I heated it red hot, and passed it obliquely from one side to the other of the thickest and most prominent portion of the dewlap. I inserted in this wound a small fillet of new thread, coated with basilicon, to which may be added, if necessary, a little of the powder of cantharides, for the purpose of increasing local irritation, and exciting suppuration. No sort of aliment should be given, but the use of enamata, diluting and antispasmodick drinks should be continued.

The bowels generally open about the third day, and cutaneous perspiration immediately commences. In all cases in which the crisis was clearly marked, and in which it took place before the ninth day, the animal was saved: if the symptoms were not calmed before this period, it died. In the latter case, I should recommend killing the animal, without waiting the progress of the disease: in the former, I would substitute, instead of diluting drinks, a strong decoction of bitter herbs, such as the serpentaria virginiana, absinthium, veronica and centaurium. To this decoction should be added, at intervals, some grains of jalap, in order to make it purgative. When the symptoms of disease totally disappeared, I

prescribed nutritive substances, such as corn bruised and parboiled, coarse barley or wheat flour, softened with warm water, mixed with a little common salt. This light diet was gradually superseded by good forage. The animal should be exercised as much as possible, care being taken to preserve it from the coolness of the night air. My instructions also contained circumstantial details of the process necessary to purify sheep-folds and stables where the disease has appeared, and measures for the prevention of it among other domestick animals, with the mode of treatment of such as relapse.

Propositions for peace were now under consideration at Passeriano, but this did not delay our preparations for war, and we remained constantly on the alert. The preliminaries were finally adjusted, and an opportunity was thus afforded us to continue our studies with security, and to complete the organization of the *ambulances*.

My treatise on the above epidemick was disseminated throughout Venetian Frioul, and its happy results were soon witnessed: the mortality was sensibly diminishing; the progress of the contagion was arrested, and it soon ceased.

As we cannot but attribute the development of this disease to the continuance of the winds, which had blown almost constantly from the south, and to the weather of the spring, which had been warm and moist, so likewise we cannot doubt that the change of season and temperature had much influence in arresting it; in the same manner as the north winds drive off the plague from Egypt.

Whatever may have been the other causes which assisted in removing this disease, the inhabitants of those places had punctually followed the rules laid down in my treatise. The government of Udino testified their grati-

tude for my services in the following complimentary letter:—

"*To M. Larrey, chief surgeon.*

"Your work on the cure of cattle affected by the late epidemick, merits our gratitude. We have waited the effect of your treatment, in order to give you an account of it, and we are happy in being able to assure you, that the remedies have been attended with complete success, wherever we have had an opportunity of applying them. We were unfortunately situated; being prevented from using them in many instances, by the requisition of their services for the army, diseased as they were; this caused the loss of many of them. Your work will be valuable, from the circumstance of our having been enabled by it, to rescue some of the cattle affected with contagious diseases. Our impoverished circumstances prevent us from testifying our gratitude in any other way than by the lively and sincere expression of it. You will however enjoy the satisfaction of reflecting that you have mitigated the distresses of the inhabitants of an unhappy country, by enabling them to preserve their cattle, so necessary to their own subsistence."

Signed by the president,

"BATOLDI."

These labours were scarcely finished, when general Desaix, who came to visit the hero of Italy, and to review his fields of battle, desired me to accompany him to Trieste. The preliminaries of peace agreed on between the French and the Austrians, permitted me to take advantage of an opportunity to spend a few days with this great commander, who had honoured me with his friend-

ship, in a particular manner, during the campaigns on the Rhine. The general being desirous to remain *incognito*, wore no mark of his grade, and I also followed his example; we travelled post from Udino in plain dresses, and with a single servant.

We soon reached Monte Falcone, a small ancient city, where, with much interest, we surveyed the ruins of some pieces of Roman architecture, and a mineral spring, sulphureous and chalybeate, but little used at present, although much esteemed in the time of the Romans, as is attested by inscriptions in a good state of preservation, placed near the baths. These waters have a very salutary effect in diseases of the skin, rheumatick affections, and particularly in curing wounds, attended with caries of the bones.

At this place I had an opportunity of witnessing the moderation of character which eminently distinguished the illustrious general whom I accompanied. Never shall I forget the calmness and sang-froid with which he tolerated the insolent behaviour of some French officers, travelling also to Trieste, who, without knowing us, were our competitors for the post-horses, &c. the number of which was very limited. Some days after, I mentioned to him, on the part of the officers, who had discovered our rank, their regret at what had happened; he answered mildly, "My dear Larrey, I had forgotten that occurrence before I left the door."

Trieste is a new city, favourably situated on the declivity of a hill, which extends in a semi-circular form on the borders of the gulf on which the port is built. The town rises gradually from the water's edge, in such a manner as to form, with the hill, which is covered with orchards and gardens, a picturesque amphitheatre. On the day after our arrival, we visited the port and the vessels lying in the road: they consisted of three ships of

the line, and three Spanish vessels loaded with quick-silver.

General Desaix now saw, for the first time, a sea-port town, and men-of-war; he evinced great curiosity by examining all their various parts, and inquiring into the use of the most minute articles. I did not foresee the object of this curiosity, by the result of which he soon after profitted.

He examined, also, in all their minutiæ, the port, the arsenals, and the magazines. The individuals of various nations who were collected in this port, attracted his notice, and gave occupation to his inquisitive talent. He stopped some of these strangers in the street, to question them about their country, and its customs. After spending twelve hours in looking at every thing curious or interesting, we returned to the inn, where we supped in ordinary. The company was numerous, and composed chiefly of Austrian generals and officers of the staff, attached to the division cantoned in this country. These officers, supposing us employed by the administration, took every opportunity of eulogizing the French soldiers, and especially the generals who had immortalized themselves by their brilliant exploits. After rendering homage to the conqueror of Italy, they spoke of the illustrious defender of Kell, general Desaix. These eulogiums, however well-merited, gave little pleasure to the modest Desaix, and I soon rose from table, with my friend, who congratulated himself on not undeceiving these flatterers.

The next morning at break of day, we took the road to Udino, passing through Aquilea, which yet contains some monuments of the ancient city of that name, formerly one of the most flourishing of the Roman empire. These ruins, as in all the western parts of Italy, speak

most eloquently the ravages of the ferocious Attila, with the Huns under his command.

A few days after our return to Udino, the peace of Campo-Formio was concluded, and general Desaix returned to France. General Bonaparte, the commander in chief, visited the frontiers, and reviewed his whole army. He commenced with the advanced guard, which was under the command of general Bernadotte; he attended, with interest, to the first division of *flying ambulance*, attached to this corps of the army; he appeared pleased with the form of the carriages, the manœuvres which this surgical legion performed in his presence, and with the military organization of the individuals composing it.

The second division of this *ambulance* was established at Padua. The commanding general reviewed it, and was not less pleased than with the first. The third division was not completely organized. I remained some days with the advanced guard, for the purpose of examining the young surgeons of this corps, and classing them according to their degrees of instruction. In passing through Venice, I finished my inspection of the hospitals.

From Venice I returned to Milan, by way of Padua, Porto Legnago, Peschiara, Pergama, Breschia, and Pavia. Peschiara is a strong place, remarkable for its situation near the lake of Guarda, whose fertile banks, adorned with small towns and populous villages, present, during the summer, most charming and picturesque views. Pergama is a handsome little town, distinguished by the affability of its inhabitants, and the mildness of their character. At Breschia, we visited a fine manufactory of arms, and many palaces adorned with paintings.

I was desirous of remaining at Pavia, in order to visit the celebrated professours of the university. I paid my respects to the immortal Spalanzi, and to the learned

anatomist, Scarpa. They received me with apparent pleasure, and I was flattered by a present made me by the latter, of a copy of his *Treatise on the Nerves of the Heart.*

I also visited the anatomical cabinet and the general hospital. The cabinet contains an extensive series of waxen models of all parts of the human system, copied from the fine collection in the cabinet of Florence. These pieces, notwithstanding their beauty and variety, interested me less than the natural preparations of the nerves of the heart by Scarpa.

I have thought it unnecessary to say any thing more of the manners and customs of Italy, than is contained in the short details which I have given of the city of Venice. From Pavia I returned to Lodi, and arrived at Milan in 1797.

I gave an account of my labours to the commissary general Villemansky, to the minister of war, and to the board of health at Paris. In consequence of the advantageous report of my conduct made by the commissary general, the commander in chiefexpressed his satisfaction in a very flattering manner. Peace being made, and my mission terminated, I returned to Paris, and resumed my functions as professour of the military hospital of Val de Grace. I arrived in time to commence the winter course.

I had scarcely finished a demonstration of the three first parts of anatomy, when I received orders, as one of the three surgeons in chief appointed by the government, to join the army destined to act against the English. I was specially attached to the right wing of the army commanded by general Desaix: the head-quarters of which were at Lille. I was prepared to take my place in the army, when I received a new order to repair to Toulon. All the pupils of the military school attached to the hospital, expressed their regret at my departure. The pledges of attachment which I received on this occasion, are deeply engraven on my heart.

CAMPAIGNS

IN

EGYPT AND SYRIA.

LITTLE did I think, when I received the order of government to repair to Toulon, for the Mediterranean expedition, that I was destined to follow the French army, under the command of general Bonaparte, into the richest and most interesting country in the world.

The great preparations which were made for the embarkation of this army, and the presence of a chief so justly celebrated, who was to command it, announced the importance of the expedition. Zealous to merit the confidence of the government, I made every effort to fulfill its intentions, as chief surgeon to a body of thirty thousand choice troops.

An order was issued to the health officers connected with this expedition, to procure assistants, and every article necessary for their respective service. It was incumbent on me to perform this first part of my duty in a very short time.

Consequently I wrote to the medical schools of Montpellier and Thoulouse, requesting them to send me, with the least possible delay, a specified number of intelligent surgeons, who would be capable of supporting the fatigues of a long and laborious campaign.

My invitation was scarcely published in the schools, when all expressed a desire to partake our dangers and our glory. A hundred and eight surgeons, comprising those in the divisions departing for Italy, were embodied under my orders at the period of embarkation, exclusive of the surgeons of the different corps of the army.

I employed those who remained at Toulon, during our short stay there, in the preparation of thirty chests of dressings for wounds, calculated for easy carriage in the rear of the divisions. Meanwhile my assistants exercised themselves, professionally, in the military hospital of instruction in this city.

I made a collection of surgical instruments and apparatus, and a sufficient number of litters, perfectly flexible, and convenient for transportation. My colleague Desgenettes, chief physician, superintended the preparation of the medicines. The other branches of the medical department were well attended to.

On the 13th of May, 1798, orders for embarking being given, after putting all the materials necessary for medical and surgical operations on board a vessel destined for their transportation,* we made a partition of the officers of the medical staff, who were distributed by divisions in the principal ships of war. Each of the divisions of *ambulance* were provided with one or more chests for dressings, with medicines and a case of instruments, in order to assist the marine surgeons, in case of accidents, or naval engagements, and in order to be in readiness to follow the military divisions, whenever they should make a descent.

The remainder of the surgeons were embarked on board other vessels of the squadron and convoy; they

* This vessel was captured in her passage by the English; an event productive of great distress to our hospitals in Egypt.

were provided with every thing that might be serviceable to the troops, in such manner that every vessel containing but a hundred men, was provided with its surgeon.

General orders were issued to them by the officers of their departments, relative to the preservation of the soldiers' health during the voyage, and the duties they were to perform, in concert with the naval surgeons, in case of an engagement by sea, and the line of conduct they were to pursue, from the time the troops marched into the interiour of the country.

All the vessels of the squadron and convoy, which were in the Toulon road, set sail on the 19th May, to the sound of martial musick, in the midst of lively acclamations, which expressed the general satisfaction on the departure of the flag-ship, admiral Brueix, in which were Bonaparte the commander in chief, the principal members of the commission of arts, and the etats-major of the two armies, comprising the physicians and principal surgeons.

After a prosperous voyage of twenty-one days, we arrived off Malta. Many convoys had joined us during the passage, for instance, those of Genes and Ajaccio; the retarded progress of that of Civita Vecchia gave us some alarm; it rejoined us on our arrival before Malta.

Preparations were immediately made for a descent which was effected on the tenth of June by Bonaparte in person, whom I had the honour of accompanying on this occasion. We experienced little resistance; after twenty-four hours' siege, and as many of negociation, Malta surrendered at discretion to the French arms.

I visited the principal parts of the island; I established a military hospital at Be[illegible]rkara, the head-quarters; this is the Cita-Vecchia of the ancient knights. It is a plea-

sant little town, situated in the midst of the island, and contains some fine houses, and delightful gardens.

The whole island is well cultivated, although it is a calcareous rock: it is hilly, and intersected by little valleys, in which the water, deposited by the rains, continues for some time, and augments the fertility of the soil which has been formed on this rock with great labour.

The island is covered with terraces of different forms and extent, disposed like amphitheatres, enclosing beautiful country-seats. The platforms are so many gardens, adorned with orange, citron, and fig-trees, and generally with all the fruit-trees of Europe and the ancient continent. They are also enriched with the most superb and rare flowers. A large part of the island is devoted to the culture of cotton, carthamus, wheat, millet, and farinaceous herbs. The nopal grows here spontaneously; much advantage might be derived from this plant, if the cochineal insects could live here.

The city of Malta occupies the eastern side of the island, it is surrounded by impregnable ramparts, flanked at regular distances by towers, containing vast numbers of cannon. It is handsomely built: the streets are well made; it contains some elegant palaces and churches, and a superb hospital, in which we placed our sick and the small number that were wounded in our attack on this place.

The port is divided into several basins or canals, of sufficient depth for the anchorage of men of war; the height of the surrounding rocks shelters them from the storms and tempests. Our fleet remained here forty-eight hours.

The air is good and pure, especially when the westerly winds prevail, which is the case for three fourths of the year; they are fresh and moist; they temper the extreme heat of the day, but are noxious during the night,

on account of their humidity: the moisture is so great, that a person exposed to it for an hour will be wet, as with a shower of rain. The inhabitants are careful to remain within doors, after sunset; or if it be necessary to go out during the evening, they wear a cloak; without this precaution, they are exposed to catarrhal disease, intermittent fever, and ophthalmia.

The south wind *(siroco)* as I learned from the physians, prevails here during the months of March, April, and May, at intervals; it is unwholesome, predisposing to malignant and putrid diseases; and this is the season in which the plague is most to be feared.

There is but one spring of water in the city, which supplies the port and the town. The water is limpid and good: cisterns cut in the rock serve to collect rain water; which is used for domestick purposes, and for watering the soil.

Almost all the inhabitants of this city were originally from Italy, Greece, and the coast of Africa; they are all of a swarthy complexion, of a dry and robust make, industrious, and of a mild and timid disposition, and very hospitable.

The knights of Malta are the supporters and protectors of a great numbers of indigent families.

This island is one of the finest ports of the Mediterranean, and forms a place of commercial deposit for almost all the productions of the East. In a military point of view, it may be considered as the citadel of this sea.

On our entrance into Malta, the religious military order, which had been there established, was dissolved, and the knights were dismissed with pensions proportioned to their grades and services. The magnificent arsenal of the castle still contained the armour of its founders: with peculiar veneration, I beheld the armour of the famous Lavalette, the first grand master, who so nobly

resisted the obstinate siege and reiterated assaults of the Turks.

The ornaments of the principal church were remarkable, both for exquisite workmanship, and the materials of which they were composed: gold, silver, and precious stones shone on all sides.

The time for our departure drew near. The principal physician and myself, therefore, were occupied in the organization of the hospitals designed for the troops that were to be left for the defence of the city; we made a report of this first campaign to the minister of war.

The fleet weighed anchor on the 18th June, with the army on board, and in twelve days lay to before Alexandria, a city celebrated in antiquity. Having during the voyage, suspected that we were destined thither, I had studied on board every thing relating to the medical character of Egypt, in the works of the most celebrated physicians and travellers, and from two respectable interpreters, Venture and Magalan, who had lived in this country, I acquired various information which might be serviceable to me, in directing the important operations of the service confided to my care. I then drew up an instructive and systematick notice which I addressed to my colleagues, the surgeons of the first class, relative to their respective duties, the influence of the climate of Egypt on Europeans, and on pestilential carbuncle, a principal symptom of one of the most dangerous diseases that we experienced in this country.

Our corps consisted of about ten thousand men: we speedily disembarked and marched up to the walls of Alexandria, which we carried by assault, after several hours' fighting. Two divisions of *ambulance* followed the two wings of the army, and I remained in the centre with a third, near the commander in chief, to receive his orders, to watch the motions of the two other *ambulan-*

ces, and to give immediate assistance to the wounded. In this battle, we had two hundred and fifty wounded; among the number Kleber and Menou, generals of division, and adjutant general Lescale. I had all these wounded transported to the convent of the capuchins, which afterwards became a great establishment. Some of the wounds required important operations, which I immediately performed. I now remarked, for the first time, the favourable influence of this climate on wounds: I shall speak of it in the conclusion of this campaign. The short time in which the wounded were healed, was truly astonishing.

Part of our troops being in *bivouac* on the ruins of Alexandria, were bitten by scorpions, of much larger size than those of Europe. This accident was more terrifying than dangerous to the soldiers; and the symptoms disappeared on a single application of sea-water, or acid, or alkaline substances.

In concert with my colleague Desgenettes, I organized the medical staff of the permanent hospitals of this place. I then attached a light *ambulance* to each of the five divisions of the army, and retained near me, at headquarters, a *corps de reserve* of surgeons, forming a sixth *ambulance*.

On the 6th of July, the commander in chief marched for Cairo, and the command at Alexandria, was given to general Kleber. I entrusted the hospitals of this place to the care of M. Masclet, surgeon of the first class, a young man of uncommon merit, who died of the plague, a short time after. He fell a victim to the devotion and zeal with which he discharged his duty. M. Antony Dubois, physician to the commission of arts, undertook the treatment of general Kleber's wounds, of which, by great attention, he made a complete cure. His advice was no less useful to those that were wounded in the naval action at Aboukir.

An obstinate nostalgia combined with dysentery, compelled professour Dubois to return to France.

Desaix's division formed the advanced guard of the army, while Dugua took the route of the sea-coast to possess himself of Rossetta, which was effected without any resistance. He then established on the Delta, a medium of speedy and uninterrupted communication with the army. Dr. Desgenettes, who attended this division, opened a hospital in this town, for the sick.

The main body of the army, without provisions and water, entered the arid deserts on the borders of Lybia, and after a painful march of five days, reached Damanhour, the first place in the interiour of Egypt, which afforded a supply. Never did an army experience such great vissitudes and such painful privations. Tortured with the rays of a scorching sun during the day, marching on foot over a still more scorching sand, traversing an immense extent of dreary wastes, in which with difficulty, we procured a little muddy water, the most vigourous soldiers, parched with thirst and overcome by heat, sunk under the weight of their arms.

Some watery low grounds promised* a termination to our distress, but it was only to plunge us into a greater, and to induce complete debility. Being called too late to some of our men, my services were useless. This manner of dying appeared to me mild and without pain; for one of them said to me, in the last moments of his life,† "I feel myself in a state of inexpressible happiness." I, however, restored many of them with a little soft water,

* See the memoir of senator count Monge, "Decade Egyptienne."

† The death of those affected with asphyxia, appeared equally mild. This remark has already been made by professour Portal. See his interesting observations on *asphyxia* caused by mephitick air.

mixed with a few drops of sweet spirits of wine, which I always carried with me, in a small leather bottle. I also used sulphurick ether, or the mineral liquor of Hoffmann, incorporated with sugar, with advantage.

Numerous bands of Arabs hovered about us while on our march, and harassed our detached troops. The soldiers who separated from the line were either killed or carried off: a surgeon of my *ambulance* was among the number of the first victims.*

The possession of Damanhour revived the fallen spirits of our soldiers. They were now able to slake their thirst, and to obtain refreshments. This first opportunity of repose restored their strength and their courage, and at the time of our departure for Rahhmanieh, they had almost entirely recovered from their fatigue.

We dressed the small number that were wounded in one of the principal houses of Damanhour, whence they were carried on the succeeding day to Rahhmanieh. At Damanhour the commander in chief received a kick from a horse, which contused his right leg so severely, as to threaten serious consequences; I was fortunate enough to prevent them, and to effect a cure in a short time, notwithstanding the fatigues of the march, and the natural activity of this officer, which prevented his repose.

On leaving Damanhour, the phalanx of head quarters, where I then was, with the sick, was assailed on all sides, by a numerous body of Arabian horsemen and mamelukes, and would probably have been destroyed, but for the prompt assistance of Desaix's division, and the vigilance and skill of colonel Dupas,† who then com-

* The health officers were as much exposed as the soldiers, for they marched with them, in the centre of a square batallion.

† Now count of the empire, and general of division.

manded the guides of the army; some of our division however, were wounded.

A view of the Nile at Rahhmanieh, was highly gratifying to us all, and we hastened to it in order to slake our thirst. From this time, our march was less difficult; we experienced fewer privations; and we were enabled to support the heat, by bathing every evening in the river. This bathing refreshed and strengthened us.

Before our departure from this place, the flotilla, under rear admiral Perree, ascended the Nile, and rejoined us, after which we kept as near together as circumstances would permit.

We advanced to Cairo, keeping on the west side of the river, which abounded in water-melons, on which the soldiers chiefly subsisted.

We arrived at the village of Chebreisse on the 13th of July, at the break of day, and found the army of the mamelukes drawn up in order of battle. A brisk action ensued, in which they sustained great loss; we had twenty wounded, who were immediately dressed. A small cask of rum, given by general Bessieres* from his private stores, contributed much to the recovery of these brave men.

The fatiguing and forced marches of our army produced in one of the soldiers a hernia; it was suddenly formed, and became strangulated. He was immediately brought to our *ambulance;* but a gangrene appearing in the intestines, and extending to the viscera of the abdomen, put a period to his existence in the space of two hours, and rendered it impossible to perform an operation. I have witnessed but one other example of such sudden effects from this cause.

* Now marshal of the empire, and duke of Istria.

The flotilla arrived before the town, and sustained an engagement, in which perished many of the sick and wounded, whom we had placed under its convoy. Among the wounded, in this affair M. Suci and M. Lacuel an officer of the etat-major, were the greatest sufferers. The army continued its march to Verdam, where the troops halted and refreshed themselves. Here I formed a depot of *ambulance*, in order to collect all the sick that followed the head-quarters. M. Bouquin, a surgeon of the first class, being charged with the *ambulance* for the sick of the flotilla, attended diligently to the wounded.

The next day we came in sight of the mamelukes, who had pitched their camp between the pyramids and the Nile; it was protected by a battery at Embabeh.

The determined progress and fierce countenance of these horsemen, announced their resolution; indeed, they first gave the signal for combat. I had taken care to visit the *ambulances* of the divisions, and directed the preparations to be made, in order to give the wounded, should there be any from this battle, the earliest and most efficient assistance.

The two armies soon came to close quarters; the battle was bloody, and terminated in the loss of a great proportion of the mamelukes, and the flight of the remainder; these divided into two sections, one of which reached Said, and the other escaped towards the frontiers of Syria.

We had about two hundred and sixty wounded. I ordered them to be carried to the castle of Gizeh, which I converted into a superb hospital, where the requisite operations and dressings were performed with the greatest care.

At Gizeh the troops suffered only from fatigue, from diarrhœa, and slight dysentery, probably arising from the coldness of the night, and the quantity of melons eaten

by the soldiers, and not as some physicians have imagined, from the water of the Nile, for it never has an injurious effect.* These slight indispositions were soon removed by repose, wholesome food, and refreshing stomachick drinks, which we met with at Cairo. We took possession of this city as well as the citadel, on the 25th of July, 1798.

This great city is irregularly built, and although it contains many scattered ruins, and presents the appearance of misery, is immensely rich, and afforded us great resources for the organization of the hospitals successively established here; thither as soon as possible we transported the sick and wounded who had been left at Gizeh. I superintended the treatment of the wounded, in whose cases we made some important remarks on the figure of wounding agents; on the particular symptoms which succeeded, and on the readiness with which wounds were healed. I shall mention these remarks, together with many others, hereafter.

After regulating the medical staff of the two divisions of Desaix and Vial, which were sent, the first into Upper Egypt in pursuit of Mourad Bey, the second to Damietta, in order to take possession of the town, and reconnoitre the borders of the lake Manzaleh, I departed on the 5th of August, with the general, and a part of the army, in pursuit of Ibrahim Bey and his mamelukes, into the province of Charquieh, on the route to Syria; I entrusted the direction of my department at Cairo, to M. Roussel, a surgeon of the first class, who was nominated chief assistant surgeon.

Ibrahim Bey fled before us; we overtook him at Salehyeh after three days' forced march, just as he entered

* This water is very palatable, and digests with the greatest facility. Analysis has proved that it is superiour in quality to that of the rivers of Europe.

the desert, on his way to Syria. Our escort of cavalry attacked the mamelukes with impetuosity, and a brisk combat took place, which terminated in their flight. We had fifty wounded, and some killed.* We dressed the wounded on the sand, and then sent them to the mosque of Salehyeh, where I stationed an *ambulance*, under the care of M. Mongin, a surgeon of the first class.—Most of the wounds were received from sabres. In this battle we experienced, for the first time, the terrible effects of the Damascus blades of the mamelukes.

Destris, the chief of brigade of the seventh regiment of hussars, had one of the most remarkable wounds. Besides seven large sabre wounds, two on the shoulders, which divided the muscles, and part of the bones, and a third on the back, which divided the muscles, and two of the spinous apophyses of the dorsal vertebræ, he received a ball which buried itself in the thorax, and produced an effusion of blood that required the operation for empyema, which I performed previous to my departure for Cairo. His cure may be regarded as an extraordinary phenomenon.

I was under the necessity of making sutures in some cases, of using the uniting bandages in others, and of applying the trepan in many. In a subsequent memoir, I shall detail a case in which I performed the excision of the head of the humerus, and preserved the arm. In general these patients recovered, with the exception of four, who died of tetanus, a disease of which I shall have occasion to speak in another part of this work.

On our return to Cairo, the general received advice of the defeat of the squadron at Aboukir, after an obstinate engagement, in which some of our vessels blew up, and

* In this campaign we took a numerous and rich caravan, laden with India goods, which were sold for the benefit of the soldiers.

others fell into the hands of the English. A great part of those who were wounded on this occasion, were attended, at Alexandria, by the naval surgeons. I shall not speak of their wounds, having had no cognizance of them.

On my arrival at Cairo, I organized the surgical staff, and in the principal hospital I established a school of practical surgery, for the instruction of the young surgeons of the army. I carefully superintended the treatment of the wounded, and of those affected with diseases of the eyes, for the ophthalmia had already appeared.—This was at the period of the overflowing of the Nile.

In Desaix's division, which remained a long time on this river, in Upper Egypt, the most numerous cases of ophthalmia had occurred.

The physicians and surgeons who had patients afflicted with this disease, differed in opinion as to the causes which produced it, and as to the mode of treating it. The empiricks, who practised in this country, pretending that they alone understood a disease incident to their climate, imposed on the credulity of many of the soldiers affected with it, and the consequence was, that most of them lost their sight.

On this account I thought proper to publish a memoir on this disease, which I addressed to my colleagues, the surgeons of the first class, in order to establish a proper mode of treatment; this I also communicated to the institute at Cairo.* I shall here give the contents of this memoir, with some additions which I have since made. The directions contained in it were adopted after its publication, with such success, that this disease, even in the hands of the young physicians, became quite manageable.

* Previous to this period, no treatise on this ophthalmia had appeared.

MEMOIR

On the endemick Ophthalmia of Egypt.

The eyes, being suddenly affected by the vivid rays of the sun, whether direct, or reflected by the white sands of Egypt, are the parts which are first sensible of the effects of a suppression of cutaneous perspiration: the result of this is a long continued ophthalmia, which, in many cases, is succeeded by total loss of sight.

The following were the symptoms observed by us: swelling of the eyelids, the conjunctiva, and sometimes of the coats of the eye: very acute local pain, compared by the patient to the sensation occasioned by the presence of grains of sand (this caused by the distended vessels); defect of vision, and difficulty of encountering vivid light. To these incipient symptoms succeed violent pains in the head, vertigos, and insomnia. The secretion of the lachrymal glands is diminished, becomes acrid, and irritates the eye-lids and puncta lachrymalia. All these symptoms increase in violence, and are sometimes followed by fever, and even by delirium. The disease arrives at its height in three or four days, sooner in some instances, later in others. Like other inflammations, it has its stages or periods.

Sometimes it is less acute, and of a serous character: in this case it is more gradually developed, and causes less pain; the redness is slight, and the vessels of the conjunctiva are yellowish; there is, in this case, œdema, or swelling of the eyelids, and a redundance of tears; the patient acquires a swarthy hue; the tongue becomes foul, from which circumstance this ophthalmia may be regarded as symptomatick or serous.

The termination of the ophthalmia is various. When it is inflammatory, and is trusted solely to the resources

of nature, about the sixth or seventh day many parts of the internal surfaces of the eye-lids, and of their angles, suppurate. These ulcerations gradually extend to the conjunctiva, and to the transparent cornea, and frequently perforate it. Sometimes the cornea, bursts suddenly, and without ulceration, as I have often seen. The rupture takes place during the first twenty-four hours of the disease, when the conjunctiva is but slightly reddish. It would be difficult to explain the causes of this sudden and spontaneous rupture. I shall confine myself to a detail of the phenomena which attended it in Egypt, and the consequences resulting from them. The aperture which remained in such cases was of a roundish form, and of a diameter nearly equal in every instance; it permits a portion of the aqueous membrane or iris to pass, and forms a hernia, known by the name of *staphyloma;* the projection formed by the aqueous membrane, is of a dark grey; that of the iris is of a deeper colour: this tumour is sensible to the contact of the smallest external bodies, and even to the friction of the eye-lids. The sight is more or less obscured, and the pupil partly or totally obliterated; but in general, the *staphyloma* gradually diminishes, returns to the anteriour chamber, and the membranes resume their situation. Sometimes a portion remains without, which becomes strangulated by the contraction of the aperture, loses its sensibility, and acquires a certain consistency; or it swells, divides into many lobules, and assumes a cancerous character, especially if there be a venereal taint.

When the *staphyloma* recedes of itself, the aperture in the transparent cornea closes, by the sinking of its edges, and a small, opake, deep cicatrix remains, which at first intercepts the passage of the rays of light.

In some cases the crystalline and vitreous humours are also displaced, their membranes are impaired and sup-

parate, and the eye is disorganized. This is observable in many of the inhabitants, especially in indigent persons, who sleep almost naked on the earth, live on coarse food, and are exposed during the day to the dust and rays of the sun, without an attempt to avoid them.

The hypopion rarely followed this ophthalmia, and presented no peculiarities when it did occur. It may be known by the appearance of an opake point in the transparent cornea, which obstructs the passage of light through the pupil. This point gradually increases, forms a projection on the surface of the eye, and occupies a larger or smaller space in the cornea, while it separates its strata. A slight fluctuation may be felt with the point of a stylet, which distinguishes hypopion from pterygium or albugo.

Pterygia were frequent: they occupied a part, or sometimes the whole surface of the transparent cornea; in the first case, the patient is able to discern objects; in the latter, the cornea being entirely opake, the blindness is complete. They do not appear until the termination of the disease, and the symptoms are regular.

When the patient is irritable, and the ophthalmia of long continuance, the swelling of the conjunctiva is frequently very considerable; this membrane forms a tumid ring about the cornea, and projects beyond the eye-lids, which become inverted, and swell, and are with difficulty reduced.

The tarsal cartilages seldom partake in this inflammation. When this occurs, the lachrymal ducts are corroded, and destroyed by the suppuration which usually succeeds; the eye-lids lose their form, and are retracted. Loss of sight generally takes place a few days after from consecutive inflammation of the globe of the eye. I have seen some instances of this.

Inflammatory ophthalmia, unless it be very slight, seldom terminates well, without the assistance of art.

It is not so with serous ophthalmia; it may terminate by means of perspiration, superabundance of tears, and especially by diarrhœa.

In most cases ophthalmia weakens the eye, predisposes to cataract, fistula lachrymalis, gutta serena, and is frequently followed by nyctalopia. Many persons, being cured of ophthalmia, have been affected by one of these latter diseases.*

The principal causes of ophthalmia are the violent heat of the days, the reflection of the rays of the sun from the white substances spread over the soil of Egypt, irritating the sensible parts of the eye, the immoderate use of spirituous liquors, and venery; the dust, which settles under the eyelids, and causes irritation; and especially the suppression of cutaneous perspiration, occasioned by the sudden transition of the atmosphere from cold to heat; add to this, the coolness and humidity of the nights, acting on the soldiers who are in *bivouac*.

The sudden suppression of diarrhœa has the same effect: of this we had many instances at the close of the campaign at Salehyeh, in 1798.

I remarked that persons of fair complexion were more subject to this disease than those with brown skins. I likewise observed that the right eye was more severely affected than the left, for most of those who became blind of one eye, lost the right: this perhaps proceeds from a habit of winking the left eye when we meet with vivid rays of light, while the right is kept open; perhaps also from a habit which very generally prevails of sleeping

* In cases of nyctalopia and gutta serena, we used moxa with success on the decussation of the principal branches of the fascial nerve or small sympathetick.

on the right side, so that this part of the body is most exposed to the humidity of the earth.

This disease is more prevalent at the time of the overflowing of the Nile, than at any other season.

If ophthalmia be systematically treated in its early stages, it is not dangerous; but the blind confidence of the soldiers in empyricks, and their neglecting to apply to the hospitals, together with their inattention to the proper regimen at the commencement, rendered our prescriptions useless.

When persons affected with ophthalmia are suffering under the consequences of some other disease, such as syphilis, the symptoms are more acute and more rapid: the ophthalmia is then characterized by peculiar appearances: the redness at the extremities of the eye-lids is more distinct, the pus, which flows from the eyes is of a greenish colour, as in gonorrhœa; the parts which it touches are excoriated, and the patient suffers much during the night. It is important to know the circumstances which give rise to this combination.

The sudden suppression of gonorrhœa, in Europe, frequently produces the particular ophthalmia of which we are treating, and the best means of cure is to re-establish the blennorrhagia.

The treatment should be according to each species of ophthalmia, and the effects resulting from it. I shall mention the means by which we obtained most success, in both cases.

When ophthalmia is inflammatory, bloodletting in the veins of the neck, in the arm or foot should be first performed: this should be repeated according to the plethorick habit of the patient, and the severity of the inflammation: leeches should then be applied to the temples, as near to the eye as possible, or if these cannot be obtained,

small incisions should be made in the same places: I have seen the most happy effects even from these.

To these prescriptions the pediluvium should be added, and the steam of a decoction of emollient and anodyne substances should be directed on the eye affected: it should be washed with a strong decoction of flaxseed, poppy, and oriental safron: care should be taken to apply them, as much as possible, between the eyelids: externally applied, they increase the œdema; cataplasms are inconvenient for this reason, besides their compression and weight on the eye.

A paste made of the white of eggs, beaten with a few drops of rose water, some grains of sulphate of alumen and camphor, applied to the eye, at night mitigated pain and diminished inflammation.

The effect of these topical remedies may be assisted by the use of cooling and acidulated drinks.

If there be symptoms of *saburra* in the prima via, some purgative medicine, or a few grains of ant. tartrite of potash may be added to their drink.

During the night, some glasses of anodyne emulsion should be administered to the patient. It is also necessary to prescribe an appropriate regimen, to increase perspiration, and to exclude the light.

As the inflammation diminishes, and the swelling abates, the collyria should be strengthened by the mixture of acetite of lead or with a weak solution of oxygenated muriate of mercury or sulphate of copper; the quantity to be gradually augmented.

When resolution commences, a decoction of pomegranate bark or a gentle solution of sulphate of zinc should be used, and to the cooling drinks must be substituted a bitter and laxative ptisan.

But if the swelling of the conjunctiva continue, and it be enlarged, small incisions should be made with the

lancet; the most projecting points may even be cut off; and the use of discutient collyria continued. Should the eyelids be inverted, and form a tumified circle about the eyes, which happens in many cases, punctures should be made in the direction of the eyelids, great care being taken not to wound the tarsal cartilages; astringent collyria may also be applied, for a few hours, and we then proceed to the reduction of the eyelids, first anointing them with cerate, and taking great care not to wound the globe of the eye: they are then retained in their proper position by a bandage, and the most perfect rest is enjoined on the patient. This mode of proceeding, which has always succeeded in my hands, requires some practice.

When these means are insufficient, the redundant portion of the conjunctiva must be extirpated, sparing, as much as possible, of the tarsal cartilages; the eyelid relaxes, and soon resumes its natural form.

Ulcers of the eyelids should be treated with desiccative and slightly *escarotick* substances. In this case, we used the following composition with success:

R. Cerate, made of virgin wax and oil of sweet almonds, (1 scruple.)
Red oxyde of mercury, purified and levigated, (4 gr.)
Tutty *(ppt.)* (gr. 16)
Camphor, to be united to the yolk of an egg, (gr. 4)
Paste of cochineal, (gr. 8)
Oriental saffron, powdered, (gr. 16)
Mix and triturate, them in a marble mortar.

A small quantity of the above composition should be rubbed on the edges of the eyelids at night, and the eyes covered with a bandage drawn moderately tight.

The treatment of ulcers of the cornea and pterigia, should not be commenced, until the inflammation of the

conjunctiva has entirely disappeared. Fumigations of red oxyde of mercury, and the application of a gentle caustick, are usually sufficient to remove them; however it is sometimes necessary to pass a seton through the ligament of the neck.*

We should not attempt to suppress the staphyloma while it is increasing: nature must first commence the reduction, and then she may be assisted by a slight and gradual compression. If the protruded part loses its sensibility, and remains outside, it must be extirpated by the scissors, with curved blades. I have had occasion to perform this operation but twice; the eye, in these two instances, recovered its functions in a great measure.

In cases of opthlamia, induced by venereal disease, the cause must be removed by antisyphiliticks, taken internally, particularly by sudorifick and depurative syrups, to which may be joined a proportionate quantity of oxy-muriate of mercury. Some mercurial substance should also be mixed in the collyria.

If opthalmia be the effect of sudden repercussion of the *blennorrhagick* flux, after appeasing the local irritation by punctures of the temples, and anodynes, it will be necessary to inoculate anew with matter of gonorrhœa, or to use an alkaline injection, which may serve instead of natural inoculation.† This means I have tried in a great num-

* If the pterygium be of considerable thickness, the small layers may be removed with a very fine bistoury. I had occasion to perform this operation on a young lady in Toulon. I destroyed a chronick pterygium which covered the whole surface of the cornea, and totally intercepted the passage of the rays of light The part on which I operated, recovered its transparency, and the patient was enabled to distinguish objects very clearly.

† Much confidence ought to be placed in the inoculation, as we possess a specifick which will cure the gonorrhœa in a very short time; it is balsam of Mecca, or if it cannot be obtained, pure balsam of Capaiba, taken in large doses: an

ber of such cases, that occurred in the hospital of the imperial guard.

When the ophthalmia arises from a gastrick affection, it requires a different treatment; bleeding is unnecessary; leeches or punctures of the temples near the external angle of the eye are sometimes necessary; the last are often serviceable on the eyelids when they are œdematous.

Warm wine and discutient collyria should be immediately applied; but on account of the affection of the stomach, vomits should be administered, followed by purges and bitter drinks. If the disease does not yield to these means, blisters should be applied to the neck or behind the ears. Discharges from the eyes are frequently cured by the use of internal remedies alone.

Few persons escaped opthalmia, in the latter part of 1797, and the commencement of 1798; in most cases it was inflammatory, and sometimes was attended with serious consequences.

In the course of the year 1800, few soldiers were affected with it, and I observed that it was almost entirely symptomatick and less severe than before; it was also more promptly cured.

What can be the cause of these differences? I impute it to the fatiguing marches which we made across the sandy deserts, and in which the soldiers were deprived of water, and passed suddenly from the burning heats of the day to the coldness and dampness of night, and from which they could not protect themselves, for want of cloaks, &c. But having learned by experience that this was the only means of preserving themselves from so

electuary should be made from it with a sufficient proportion of sugar. The effects of this remedy may be assisted by temperate diet, repose, and the use of sweetened water; acids and baths thwart this remedy.

dreadful a disease, they have been careful, since this period, to carry with them all the necessary articles of clothing.

The repose of the troops, the precautions they had taken, and their *seasoning*, or accommodation to the climate, rendered the effects of this disease almost insensible, during this last year.

At the commencement of the year 1800, the army marched to Aboukir, to repulse the English, who had effected a landing there.

Our troops formed a junction on the borders of ancient Alexandria, and pitched their tents. After the battle of the 21st of March, 1801, the heat, the fatigue of making intrenchments, and the coolness of the nights, began to affect the soldiers whose constitutions were weak, and such as had been wounded, or had had diseased eyes. The overflowing of lake Madieh, whose waters soon washed the ruins of Alexandria, increased the dampness and the coolness of the nights. In a short time, the greater part of the soldiers encamped near the new lake Mareotis, were affected with ophthalmia, and in the course of two months and a half, more than three thousand men were taken in succession to the hospitals. The disease assumed various characters: but in general, it was inflammatory; with symptoms less acute than those that attended it in the first year: in some instances, it was complicated with catarrhal or scorbutick affections. These complications were treated in the manner before pointed out. In all cases, local bleedings, by incisions of the temples and eyelids produced happy effects; they immediately eased the pain, diminished the swelling, and assisted the other remedies. General bleeding was of no service.

We attended to the state of the stomach, and to the taint which might cause a complication of the disease: when this was not the case, the rules laid down in my

memoir, were practised with complete success: the result was, that in more than three thousand cases of ophthalmia, there was not one instance of loss of sight.

The English, on their arrival in Egypt, were not exempt from this disease: they followed the method of treatment advised in my memoir, which they found in our hospital at Rosetta, and from that time, they succeeded in preserving the eyes of most of their sick.

Many Frenchmen who had previously escaped this disease, were seized, almost instantaneously, on entering France, by a blindness, which appeared to depend on a paralysis of the optick nerve, effected, no doubt, by a sudden change from the extremely hot climate of Egypt to that of France in the coldest season.

I remarked the symptoms of the disease, in the case of M. Poiree, brigadier of the guides of this army, who became blind as soon as he entered France. During his quarantine at Marseilles, he had an inflammatory ophthalmia, accompanied by violent pains in the head, which totally deprived him of sight; he was carried to the hospital for the reception of the consular guard, where he terminated his earthly career.

Here all the inflammatory symptoms had disappeared; yet the eyes were prominent, larger than in their natural state, and the iris was motionless. If the patient felt but slight pain in this part, he experienced it more severely and permanently at the bottoms of the orbits and in the course of the frontal sinus. His system was emaciated, and his mental faculties affected: after four or five months, in which he was attended with the most assiduous care, Poiree died of a marasmus.

On dissection, we found the globes of the eyes tumefied; the crystalline lens had become slightly opake; the internal surface of the coroides was of a yellowish hue; the retina was like pus; the optick nerves diminished;

the peri-orbit, and a portion of the dura mater of the anteriour cavities of the base of the cranium were detached, and the osseous parts being stripped of these membranes, were in a state of inceptive caries. The substance of the brain was softened, and its cavities, or ventricles, filled with serum.

It is important to the health of the troops, that they should not pass from one climate to another, except at such seasons as afford but little variety of temperature, or if circumstances render this impossible, precautions should be taken, to prevent the ill effects of such a change.

In order to guard against the ophthalmia of Egypt, it is necessary to avoid the direct rays of the sun, and preserve the eyes from the dust, during the day, to be well covered from head to foot at night, to put a bandage over the eyes, to keep as far as possible from moist and swampy places, to keep up perspiration by means of the Egyptian baths in good weather, and by exercise. It is also necessary to abstain from the immoderate use of wine and spirituous liquors, from food of a heating quality and of difficult digestion, and to keep up the strength of the stomach, which always inclines to debility in a very warm climate, by the use of tonicks, such as coffee, with a bitter infusion, in the morning; and finally, to wash the eyes and the whole head frequently with warm water* and vinegar.

The following peculiar case was the result of an inflammatory ophthalmia:

Maria ———, sixteen years old, daughter of a Greek, an inhabitant of Cairo, had been affected, at the age of two years, with an ophthalmia; by which the eye-lids of

* Experience taught me that cold water which acts as a sedative, as well as all other cold bodies, was less efficacious than warm.

the right eye remained closed for a long time. They opened gradually; but it appeared that the superiour eye-lid had adhered to the transparent cornea, by a membranous substance which had formed there.

This membrane, situated perpendicularly before the eye, was of a triangular form, arising from the internal surface of the eye-lid, and had contracted a strong adhesion to three-fourths of the upper part of the cornea, so that vision was totally destroyed on that side. The membranous production followed the motions of the eye-lid and eye. This disease much disfigured the patient.

Having placed her in a proper position, I passed a grooved probe between this membrane and the globe of the eye, containing a very fine bistoury, the edge of which was covered by the groove. When I had disengaged the grooved probe, I fixed the eye-lid and the eye, and cut the membranous fold from its adherence to the cornea; I then detached it from the eye-lid with this instrument, and a pair of dissecting forceps: the small portions which remained on the cornea were carefully removed, and the eye dressed with light dressings, dipped in vegeto-mineral water. There remained on the cornea a pterygium of a dull whitish colour, supplied with red vessels, which gradually and insensibly disappeared to so great a degree, that this lady, at the period of my departure from Cairo, began with this eye to distinguish objects almost as well as with the other.

A fact no less curious was remarked by M. de Lassus, a physician of the army of Saint Domingo. A worm, of the species of *vena medinensis* (gorgius) was introduced into the conjunctiva of a young negro, and produced violent ophthalmia, which resisted various curative attempts. After many examinations, M. de Lassus discovered the part which the worm occupied, and extracted it: the symptoms immediately abated, and the

patient recovered. A detailed account of this case is inserted in the medical journal of the board of health of the army of St. Domingo.

To these cases I shall subjoin those of two officers, who each lost an eye on the same side by a shot: the effects of this accident present some remarkable particulars, and such as are seldom exhibited.

M. Magny, chief of brigade of the second light infantry, received a ball at the battle of Aboukir, which grazed the external portion of the right orbit, and did such violence to the eye on this side without breaking the skin, that the nervous membrane lost its sensibility, and the eye was suddenly deprived of light. He experienced, at the same time, an acute pain in the lower part of the orbit, followed by gravedo of the head, suffusion of blood in the cavities of the eye, and swelling of the conjunctiva. He was attended, during the first fifteen days, by the surgeon-major of his demi-brigade.

On his return to Cairo, I was called to see him. The swelling of the external membranes of the eye had disappeared; but there was a great collection of liquid blood within the transparent cornea, occupying nearly three fourths of the anterior chamber. The patient experienced shooting pains in the centre of the eye, and frequent head-ach. The injured eye was evidently larger than the sound one. The patient was troubled with *insomnia* and *inquietudo*. The symptoms led me to fear a carcinomatous affection, not without foundation, for I had seen a similar case in an officer of the 75th demi-brigade, of the same army: his eye was attacked with all the symptoms of cancer, which terminated in the loss of this organ, after a long continued and systematick treatment. I am of opinion that the blood, leaving its proper vessels, cannot remain long in the sensitive parts of these organs,

without producing irritation, to a greater or less degree, accompanied by unhappy consequences.*

After trying local bleeding, in the case of M. Magny, together with the proper topical applications, and cooling drinks, I thought it necessary to discharge the blood collected in the cavities of the eye. I made a semi-lunar incision in the lower part of the transparent cornea, with the bistoury of Lafaie, as in the operation for cataract, after the manner of this author. About two *grammes* of blackish liquid blood issued from it. The discharge of this foreign matter discovered the iris, which appeared to have some faint motion; the patient immediately perceived light, but could not distinguish objects. All the symptoms disappeared, the eye was relieved, and the cornea united without the least opacity or deformity.

This officer, on his return to France, where he used mineral waters, began to distinguish objects, which he ultimately did with tolerable accuracy.

The case of an aid-de-camp of general Robin presented the same phenomena, and the result of the operation was similar to the proceeding.

A circumstance equally remarkable, occurred in the hospital of the imperial guard.

M. Dreux, a horseman of this corps, in a single combat, received a sabre wound on the right eye, which perforated the cornea, transversely, with the loss of a small

* I have long since remarked, that when the blood leaves its proper vessels, and gets into the cellular membrane, or other cavities of the body, in consequence of being at rest, and losing its calorick and vitality, it enters into a state of decomposition. The portion which coagulates, gives out the salts or acids contained in this fluid; these form new combinations, irritate the sensible parts, and inflammation follows.

The surgeon cannot pay too much attention to collections of blood in the large serous cavities, because if suffered to remain there but a short time, the life of the patient is endangered.

portion of the substance of this membrane. This wound, according to the statement of the patient, immediately discharged a dense, limpid liquor, followed by a sinking of the globe. He was then deprived of light, and suffered violent pain, attended with vomiting. He lost all hopes of ever recovering the use of this eye; but to my great surprize, the globe gradually recovered its natural form and size, in such manner, as to leave no doubt that the vitreous humour, a portion of which had escaped, had again been reproduced; this fact proves that it may be reproduced, at least in part. The edges of the wound formed a complete adhesion, and the cicatrix remained depressed without being opake. The iris, which had been wounded, regained its action, but the pupil remained sloping towards the cicatrix. This soldier before he left the hospital, saw the light, and some months afterwards was able to distinguish colours and conspicuous objects.

In wounds of the cornea, with protrusion of the aqueous membrane, or the iris, I shall point out a mode of practice mentioned by no preceding author, and which was suggested to me by an accident that occurred to my daughter (Charlotte Isaure.) When hernia of these membranes is the result of a wound in the cornea, they should be immediately reduced with great care, by means of a blunt pointed gold probe; any other metal applied to these delicate and sensible parts, might produce a galvanick action, very disagreeable to the patient. The membranes resume their former position, and thus is avoided the deformity and defective sight, which generally result from abandoning the staphyloma to the unaided operations of nature.

Charlotte Isaure, when about seven years old, was one day, at dinner, cutting her bread in small pieces, when a portion of the crust flew into her eye. Alarmed

by the intensity of the pain, she precipitately and intuitively raised her hand to her eye; but holding the knife in this hand, and her action having preceded reflection, instead of her finger she thrust the point of the knife into the centre of the cornea, which she cut obliquely through the external half.

A portion of the aqueous membrane, and even the iris were wounded, and formed a hernia about as large as a pea. The aqueous humour issued from it, the eye was sunk, and sight totally suspended. I entered at the instant. The cries of the child, and the agitation of the mother announced the accident. I preserved sufficient presence of mind to afford the necessary assistance. After placing my little patient in a suitable position; with a stylet I returned the membranous portions, forming the staphyloma, that they might be restored to their former position. After an entire reduction, I closed the eyelid, and fixed the eye by means of bandages, wet with vegeto-mineral water, and fastened by a suitable roller; pediluvia, cooling drinks, and the most rigid diet and repose in a dark chamber, effected a complete cure in a few days.

SECTION II.

The ophthalmia having now abated, and many of the sick having entered their respective corps, we began to enjoy repose and tranquillity, when on the 21st of October, 1798, the inhabitants of Cairo, excited by a great number of mamelukes, who had disguised themselves, and entered the town, for the purpose of cutting us off, on a sudden raised the standard of revolt. They seized arms of every description, and fell on the French with

great impetuosity; but the general, discovering their intention, was prepared for them. Our battalions immediately attacked and put them to flight, the most obstinate took possession of a mosque, which we were obliged to bombard, in order to force them to surrender. After 24 hours brisk firing from the citadel, they surrendered at discretion.

General Dupuy, commanding the town, was one of the first who fell; he received a wound in the left armpit from a lance, which entered his breast, and cut the axillary artery. I passed by his assassins, and found him, apparently lifeless, in the midst of the street, surrounded by his soldiers. I stanched the blood, closed his wound by strong compression, and had him carried to the house of his friend Junot, where he expired in a few moments; thence I repaired to the hospitals, to assist the surgeons in dressing the other wounded; but what was my astonishment, when I found at the gate of hospital No. 1, the mangled and bloody corpses of my two companions, Mongin and Roussel, who were killed, together with many of the soldiers, in defending the entrance of the hospital! They indeed succeeded in causing the asylum of the sick to be respected, but it was at the expense of their lives. I myself was in great danger on this fatal day; we had forty wounded in this affair.

Some of them were attacked with a disease, presenting remarkable phenomena, different from those attending it in North America, where I observed it in 1798; this was tetanus from wounds (*traumatick* tetanus).

The remedies which are usually directed by authors for this disease, produced no benefit: the wounded in this last affair, who were attacked by tetanus, all died in the space of from three to seven days; but on the re-appearance of this disease, under other circumstances, I attended more minutely to its progress and results, and

after much close research, I succeeded, as it were, unexpectedly, in saving the lives of some soldiers,* the severity of whose cases, together with the recollection of the fatal examples that had preceded them, almost led me to despair of success.

Among this day's wounded, I observed some other acute complications, which I shall hereafter mention.

Our hospitals were in the centre of the town, near the grand square Birket-el-Fyl; this situation was bad on many accounts; therefore the general ordered the sick to be transported to an intrenched plain, near the isle of Rhoda, in order to place them beyond the reach of new insurrections, and to remove them from the tumult and air of the city.

General Desaix took advantage of the subsidence of the Nile, and the cessation of the ophthalmia, from which few of his soldiers had escaped, to achieve the conquest of Upper Egypt, which was long and obstinately disputed by Mourad Bey, whose windings and rapid marches drew our soldiers into the deserts, where they were obliged to undergo the greatest privations, in addition to the fatigues of active war.

The most decisive battle that was fought by this division, was that of Sedment. The victory obtained on this occasion did great honour to the French arms. Never did the veterans of our army meet, among all the various nations they had encountered, so much courage, ardour, and intrepidity as was shown by the mamelukes in this engagement. The surgeons of division dressed the wounded on the field, and thence transported them to the hospital ships, by which they were carried to Cairo.*

* M. Boussenard, a surgeon of the first class, then di-

In many cases the wounds were complicated with fractures of the bones, wounds of the viscera, and partial or total destruction of limbs; hence many amputations were necessary, one of which was made at the scapular articulation; the operation of trepanning, empyema, and others of importance, generally succeeded.

Three men, having slight gun-shot wounds, the first, in the soft part of the thigh, the second in the calf of the leg, and the third in the right ear, arrived with this division, on the ninth day after the battle, with some symptoms of tetanus, which were increasing. The first terminated in emprosthotonos, of which the patient died on the third day; the second died on the fifth day, of opisthotonos; and the third on the seventh day, from the effects of trismus or trismos. All the remedies advised by writers were employed, without any effect.

A fourth case of tetanus, becoming chronick, (this was an officer wounded in the battle of Sedment), enabled me to observe the different phenomena of this disease, and to discover the insufficiency and futility of the medicines regarded as specificks in other parts of the world: so true is it that different climates have their pe-

rected the *ambulance* of this division. M. Wadeleuc, one of the young surgeons, distinguished himself in this affair; one of his comrades, M. Luent, was killed near him. After this battle, general Desaix pursued the enemy beyond the cataracts, and thus gave an opportunity to the commission of arts to visit the monuments of the famous Thebes, of a hundred gates, the celebrated temples of Tentyra, Carnak, and Luxor, the ruins of which still attest their ancient magnificence. On the ceilings and walls of these temples are bas-reliefs, representing limbs, cut off with instruments very similar to those used at present in surgery, for amputating. Instruments of the same kind are described in their hieroglyphicks, and traces are discovered of surgical operations, which prove that their surgery kept pace with the other arts, which appear to have been carried to a high degree of perfection.

in their orbits, and become watery; the face is suffused, the mouth distorted, and the head inclined variously, according to the species of tetanus. The parietes of the abdomen approach the columna vertebralis, and act on the viscera of this cavity, which appear to be hidden in the hypochondria, in the pelvis, and in the lumbar fossa, where the muscles contract upon and compress them.—The excretions are diminished or suppressed, and especially the stools. The ribs, to which the abdominal muscles are attached, are drawn down. The chest is contracted; the diaphragm is confined; respiration is short and laborious, the heart is bound and becomes rigid, in the same manner as the muscles; its contractions are frequent and imperfect, which must enfeeble the circulation of the blood; yet the functions of the brain remain unimpaired, to the last moment of existence, so that the unfortunate subject of this disease is sensible of the approach of death.

I shall not venture to say why the morbid principle of the affected nerves is not communicated to the brain.—This fact proves that the nervous cords are not elongations of this organ, as Dr. Gall supposes.

In complete tetanus, the limbs become so rigid, and the whole body so stiff, that it may be lifted by one of the extremities without bending. The patient falls into a state of insomnia: if he dozes, he is troubled with perplexing dreams, he is agitated, tormented, and disquieted; and endeavours to free himself from the constraint in which he is held by the rigidity of his muscles.

All these symptoms increase so rapidly, that frequently, in the course of twenty-four hours, the patient is unable to swallow, or swallows with the greatest pain. Sometimes he is seized with delirium; his pulse is small and quick; fever, followed by partial and copious sweats generally appears at night. He becomes emaciated, and

experiences acute pains; the rigidity increases, the muscles cease to act, and the skin adheres to their circumference; the salivary glands emit a white frothy substance, which is discharged from the mouth; deglutition is interrupted. It is then that the unhappy patient is sensible of his danger, and while he retains his mental faculties, he expires on the third, fourth, fifth or seventh day: an instance rarely occurs of a patient reaching the seventeenth day.

Here the immediate causes of death, are the strong compression of the viscera of the abdomen, constraint of the organs of respiration, stricture of the heart, and subsequently injection of the brain. Dissections which I have made after death from tetanus, confirm what I advance.

In emprosthotonos, the flexor overpower the extensor muscles, so as to throw the head forward on the trunk, and the pelvis on the thorax; the body then takes the form of a bow.

In opisthotonos, on the contrary, the extensors overpower the flexors; the head is thrown back, and the columna vertebralis is curved backwards; the limbs generally remain extended. This species of tetanus is more rare than emprosthotonos. I have remarked that it more speedily ends in death. It appears that the forcible retraction of the vertebræ of the neck and head causes a strong pressure on the spinal marrow, and produces a permanent contraction of the larynx and pharynx.

I shall take notice of a few cases of opisthotonos:

Pierre Genet, a serjeant in the fourth demi-brigade of infantry, aged thirty years, of a dry bilious temperament, entered the hospital on the 4th of December 1800, with every symptom of opisthotonos: his jaws were firmly closed, the muscles of his face in a state of convulsive and permanent contraction, his head thrown backwards on

the trunk, and his inferiour extremities, rigid and extended; the parietes of the abdomen were contracted and approximated to the columna vertebralis, pulse small, respiration laborious, and deglution and speech difficult.

This disease, which had appeared twenty-four hours previous to the patient's entrance into the hospital, seemed to be caused by a fall on the nose, a few days before. This occasioned slight epistaxis, and a wound on this part, but there was no fracture nor any appearance of concussion of the brain.

Opiates were immediately administered, and with cooling and anodyne drinks, warm baths, and emolient applications to the nose. These means were repeated, but without effect; I then desired the surgeon under whose immediate care this patient was placed, to apply a cauterizing iron on the course of the small sympathetick nerve and to the soles of the feet, according to the aphorism of Hippocrates, *Quæ ferrum non sanat, ea ignis sanat*, &c. I applied nine tolerably large cauteries, but their application immediately increased the pains and convulsive contractions of the muscles. Those of the larynx and pharynx, and of the parietes of the mouth, were violent and almost suffocated the patient:* this crisis, however, was followed by tranquillity, sufficiently great, to give us hopes of success, in our mode of treatment: but, two or three hours afterwards, he exhibited convulsive motions, violent contractions, and cold viscid sweats; and death put a period to his torment on the night of the 10th or 11th of December, the seventh day from the commencement of tetanus, and the thirteenth from the time of the fall which occasioned it.

* I have since had reason to be convinced that a cauterizing iron applied immediately to the wound causing tetanus, produces very good effects; I shall prove this in my second memoir on tetanus, inserted in my account of the campaign in Austria.

A few moments before his death, the head and columna vertrebralis were forcibly retracted, the inferiour extremities rigid and extended, the superiour contracted and in a state of half flexion. A thick frothy saliva flowed from his mouth of a fetid odour. On opening the body, we discovered other phenomena besides those above mentioned. I have before remarked, that gun-shot wounds in the ginglimoid articulations or on the course of the nerves are often followed by tetanus, without any other apparent cause. Yet, moisture and sudden change of temperature appear to have generated it in some persons whose wounds were very slight.

Among the number of the wounded in the battle of the Pyramids, five were attacked with tetanus, occasioned, no doubt, by the humidity and coolness of the nights. The disease on this occasion resisted the regular and varied use of antispasmodicks combined with narcoticks, taken in large doses: all these died on the third, fourth and fifth day. Their deaths were preceded by copious sweats.

At the revolt of Cairo, the wounded were dressed in the hospital No. 1, situated on the square Birket-el-Fyl, where its walls were washed by the waters of the Nile, which remain in this place three months in the year. Seven of them were seized with tetanus and died in a few days, notwithstanding the continued use of opiates, warm baths, in some cases, and cold baths in others.

Four of these were cases of emprosthotonos; two of complete tetanus, and the seventh of trismus. This last had a portion of the right ear divided by a ball. If this part had been cut off immediately on the appearance of the first symptoms, the patient would probably have been saved.

After the combat of El-Arich, the wounded were put into tents, on a damp soil, exposed to continual rains.

Eight were seized with tetanus, which presented itself under all its symptoms, and terminated in death, on the fifth and seventh days from its commencement, notwithstanding they received every assistance which circumstances would permit us to give them.

At the capture of Jaffa, we lost some of the wounded by acute tetanus. All who were affected with it died in two or three days. Moxa and alkalies, which were employed in some cases, appeared to aggravate the disease. It is to be remarked, that the hospitals were situated on the borders of the sea, and the season was rainy.

Daumartin, general of division, while descending the Nile, with his escort, in order to repair to Alexandria, was assailed by a party of the Arabs; many of his soldiers were either killed or wounded, and he himself received four slight gun-shot wounds, one in the right leg, another in the left thigh, the third grazed his thorax, and the ball of the fourth entered his right arm: the three first touched the integuments only and a small proportion of the muscles.

The general remained without medical assistance until his arrival at Rosetta; this was on the fifth day after the affair. M. Guillier, a surgeon of the first class, and director of the hospital of this place, dressed his wounds, sec. art. and directed a regimen and the use of cooling drinks. A few days after, the ball appeared near the articulation of the elbow, and he extracted it.

The wounds were in a good state, and but for the anxiety of the patient, hopes might reasonably have been entertained of a prompt and certain cure; but his agitation becoming stronger every day, fears were entertained of tetanus; in fact, on the eighth day after the reception of the wounds, the suppuration was considerably diminished, and their dressings, although performed with the greatest precaution, were attended with great pain.

On the ninth day, all the symptoms of tetanus appeared; their progress was rapid, and they terminated in the death of the patient on the fifteenth day from the reception of the wound, and the sixth from their commencement.

Perhaps the termination might not have been so unfavourable, had the arm been amputated on the first appearance of the symptoms?

Those who were wounded in the battle of Aboukir, 1798, were carried to the hospitals of Alexandria, as soon as they had received the first dressing: ten of them being exposed to the air and coolness of the nights were seized with tetanus. Its rapid progress and the situation of the wounds, in the head, trunk, or superiour part of the thigh, rendered all our assistance of no avail. This disease presenting the same phenomena as in the cases before mentioned, terminated like them, and nearly in the same periods.

In cases in which cold contributes to the development of tetanus, the irritation, transmitted from the wound to the nervous system, is augmented by the suppression of cutaneous perspiration, which extends its effects to the organs, and principally to the parts already diseased; but the irritation is principally concentrated in the nerves of the neck and throat at the commencement of the disease, or its termination. Their direct connection with the medulla oblongata and spinal marrow, their numerous interlacings and frequent anastomoses, render them liable, on the slightest impressions, to violent irritability which causes the contraction of the muscles of these regions, in such manner, as quickly to interrupt deglutition and respiration. The patient then contracts, if not a horrour, at least a repugnance towards liquids, and if the wound be so situated as to be beyond the reach of art, he is obliged to undergo all the pains

connected with this dreadful disease. Nothing can surmount the obstruction in the alimentary canal. The introduction of a gum-elastick tube through the nares is followed by convulsions and suffocation. I have had occasion to try this method, in the case of M. Navailh, surgeon of the second class, who died of tristmus caused by a wound in the face, with a fracture of the bone of the nose and part of the left orbit.

On dissection of subjects dying of trismus, I have found the pharynx and œsophagus considerably contracted, their internal membranes red, inflamed, and covered with a viscous reddish humour.

Hydrophobia, hystericks, and many other nervous affections, also extend their principal effects to these organs, and the result appears to be the same; I have also remarked, that when tetanus has arrived at its last stage, the patient contracts a very great aversion for liquids: if forced to swallow them, he is soon seized with strong convulsions. This phenomenon was conspicuous in the case of M. Navailh.

Notwithstanding the strength of these facts, I shall make no reflection on the analogy of the symptoms presented by these different diseases.

Experience proves, that when tetanus is abandoned to the resources of nature, the patient soon dies. The physician should hasten to counteract the symptoms presented by the disease. The first object is to remove the causes of irritation, and to re-establish the suppressed excretions.

This is to be effected by suitable incisions in the wound made before inflammation takes place; for should this be much advanced, incisions are useless and even dangerous; when necessary they should include as much as possible, of the wounded nervous cords and membranes; but incisions at the articulations are injurious,

and appear generally to increase the symptoms of tetanus; I have seen examples of this.

Caustick applications to the wound may be made with advantage, on the first appearance of the symptoms, provided the same rule be observed as in case of incisions. To these operations should succeed bleeding, if necessary, and the use of anodyne and emollient local applications, though their effects are generally feeble.

Internal remedies, whatever may be their properties, are almost always useless, because the patient, in a short time after the appearance of tetanus, falls into a state of strangulation; but should this not take place in the early stages of the disease, such remedies may be employed as practitioners most confide in; for instance, opium, camphor, musk, castor, and other antispasmodicks, given in large and gradual doses. We used these means, with some success, in the following cases:

One of Mourad Bey's mamelukes, named Mustapha, twenty-seven years old, of a dry, bilious temperament, was wounded on the 19th of April, 1800, by a musket ball which fractured the first phalanges of the fingers of the right hand, the bones of the corresponding metacarpus, and carried away the thumb at its articulation with the trapezium; many of the tendons and ligaments were wounded or torn away.

Mourad Bey ordered him to be well attended to, but the means that were used without knowledge of the cause, were of no effect; so that Mustapha remained, as we may say, without any relief, until the 18th of May following, at which time, Mourad Bey discovering his distressed situation, sent him to the French surgeons, and desired general Donzelot to recommend him to their care. M. Cellieres, surgeon of the second class, in the hospital of Syout, was requested to take charge of this mameluke.

All the symptoms of tetanus had appeared three days before; the suppuration from the wounds was serous and copious; its edges were red and elevated, the muscles of the arm already contracted, and in a state of convulsion, the jaws closed, and deglutition painful; the patient was constipated and restless.

M. Cellieres's first care was to make an opening of the wound, and extract the detached splinters: he then dressed it with emollients, and administered to the patient six grains of opium, mixed with four of camphor. In a few hours he became tranquil, and passed a better night; still, however, his sleep was broken by subsultus of the wounded limb; copious perspiration succeeded on the superiour half of the body; the inferiour extremities remained in their ordinary state; this amelioration encouraged the surgeon to continue the same remedies, the doses of which he increased. The symptoms diminished gradually until the 24th of May, when the patient was carried from Syout to Minyet: the difficulty of deglutition was removed, and the excretions in part re-established. The extreme heat of the day, and the journey, exhausted him; and with the coolness of the night to which he was exposed, in sleeping on the terrace of the hospital, brought on the symptoms of tetanus a second time. The same remedies were continued, but they did not arrest the rapid progress of the disease.—Warm baths were used: the second produced general relaxation, and enabled him to swallow half of a draught composed of eight grains of camphor, eight of musk, and twenty of opium. The remaining portion was taken during the day. In a short time the pains ceased, the jaws relaxed, and he enjoyed tranquil sleep. On the 19th I found him much better: suppuration of the wound was restored; his organs gradually regained their strength and functions, and he recovered.

General Lannes was wounded at the battle of Aboukir, by a ball, which passed between the bones of his leg. For five days after this he remained in his tent, and was then carried to Alexandria in an easy coach, but he still suffered much pain.

When he arrived, I was called. I found him agitated and uneasy, and under much apprehension from the consequences of his wound. His leg was swollen, and the wounds dry and painful; he had subsultus and violent contractions of the whole limb, while the foot was benumbed: his voice was hoarse, his jaws nearly closed, his eyes haggard, and fever considerable.

I left him, at his request, for a few moments, in hopes that he might sleep; but he was soon awakened by pain and general uneasiness. I dressed him with emollients, and prescribed cooling drinks and strict attention to rest and regimen.

On my second visit, three hours afterwards, I found all the symptoms aggravated; I immediately caused him to be bled in the arm, and prescribed emulsions, to which I added purified nitrate of potass, sulphurick alcoholized ether, syrup of diacodium, and a decoction of orange blossoms, in convenient doses, to be taken at the rate of a glass every quarter of an hour; the emollient topical applications were continued.

The patient was in great pain during the night, and on the next day, the leg much inflamed; he swallowed with difficulty, and his jaws were always closed. I directed the venæsection to be repeated, and the same medicines to be continued, with increased doses of the antispasmodicks.

On the following night he was tranquil, the fever had ceased, and all the other symptoms gradually abated: the wounds discharged a sanguineous matter, the spasm entirely ceased, the suppuration became abundant and lau-

dable; the excretions were re-established, and the patient slept; at the time I left Cairo, he was in a fair way of recovery. A short time after, he was able to go to France with Bonaparte.

M. Croisier, aid du camp to the commander in chief, died of tetanus in the deserts of Quatieh, on our return from Syria, from a similar wound.

M. Esteve, director general and comptroller of the publick revenues of Egypt, was attacked by a slight inflammatory quinsy, occasioned by the presence of a portion of fish-bone, which stuck in one of the sinusses of the fauces: it was so small that I could not discover it.

On the thirteenth day from the time of the accident, and the third from the commencement of inflammation, symptoms of tetanus appeared; such as stricture of the jaws, convulsive motions of the muscles of the face, accompanied by violent pain, and rigidity of all the muscles of the throat; the pulse was hard and quick, the superiour extremities were affected with subsultus; suppression of the evacuations by stool, and much difficulty in pronunciation and deglutition attended.

The rapid progress of the symptoms made me tremble for the life of my friend. I immediately prescribed sweetened mucilaginous drinks, to which I added extract of opium, castor, camphor, purified nitrate of potass, and sulphurick ether, in tolerably large doses, to be taken, a glass every quarter of an hour. The feebleness of the pulse prevented me from using the lancet. I applied resolvent cataplasms to the anteriour region of the throat; I ordered the pediluvium for him, emollient enemata, and the steam of a strong decoction of hyoscia-mus, poppy, and the root of marsh-mallows, to be applied to the throat, dry frictions on the whole surface of the body, and I removed every thing which might interrupt the repose of the patient. Step by step, I followed

all the phenomena of the disease. On the following night the patient was much agitated; his pains were violent, deglutition was suspended, the saliva flowed from the mouth, and the jaws were quite closed. He experienced painful and continual agitation; he would fall, for a moment, into a doze, and wake with delirium: there was every appearance of the most imminent danger. Happily, however, about four o'clock in the morning, this violent crisis was succeeded by an abundant sweat from the thorax and abdomen; the patient became tranquil, and was able to swallow a glass of the mucilaginous drink above-mentioned. The second glass augmented the sweat, and assisted the relaxation of the limbs; from this circumstance I was led to augur favourably of its effects; for when the sweat is symptomatick, it commences at the head and the extremities; while, if it be critical, it is formed on the thorax and abdomen. On the next day the jaws were quite relaxed, deglutition became easy, and the contraction of the muscles was much diminished. I substituted volatile liniments for the resolvent cataplasms, and a bitter and laxative ptisan for the emulsion, in order to open the prima via, and re-establish the functions of the stomach. The patient recovered in a few days.

The bone appeared to have been drawn out by a gentle suppuration, which took place in the fauces.*

* When a small bone is lodged in the fauces or œsophagus, it may be decomposed, or rendered so flexible, that it will pass into the stomach, by taking frequently of diluted mineral acids. They should be taken through a tube to prevent their action on the teeth. The strength of the acid should be accommodated to the sensibility of the parts over which it must pass. By this plan have I succeeded in removing a small chicken-bone from the œsophagus, across which it had remained firmly fixed for several hours, although an emetick had been administered, and the curved forceps and probang had been repeatedly used without success. Experi-

I have observed that the sick have less aversion to swallowing emulsions than any other liquid. They are mild and agreeable, and facilitate the effect of the other medicines, with which they are combined.

The oily frictions, advised by some authors, were used in hospital No. 2, at Cairo, but produced no change whatever in the patient.

Mercurial frictions appeared to aggravate the disease in the cases in which they were adopted. The use of this remedy, even in the venereal disease, requires the greatest precaution in Egypt; for, if mercury be applied as is customary in Europe, it produces fatuity, hepatick disorders, &c.

Cataplasms of tobacco-leaves, applied to the wounds of persons affected by tetanus, were productive of no good effects. Alkalies were applied in many cases with no better success.

Blisters applied to the throat, in trismus, did not arrest its progress; M. Navailh's case was a remarkable instance of this.

Moxa and the actual cautery, though recommended by the father of medicine, were also followed by the same results. Moxa was used at Jaffa, in three cases; the tetanus was attended by the ordinary symptoms, and terminated in death.

I have noticed a striking instance of the failure of the second means, in a case of opisthotonos.

Large wounds, such as remain after the amputation of a limb; or wounds with loss of substance, though they may be followed by tetanus, do not prove that the amputation which I propose in this disease is dangerous, or that it may not, on the contrary, be attended with ad-

ment shows, that even the acetick or acetous acid, will decompose the bones of fish, and leave them in a pliant and gelatinous state.—TR.

vantageous results; since it is not difficult for an attentive surgeon to prevent the contact of the cold and moist air on these wounds, the irritation occasioned by the presence of foreign substances, and the reflux of purulent matter, the ordinary causes of tetanus, especially in warm climates.

This intention may be accomplished by keeping the patient in a temperature sufficiently high and uniform, carefully removing all foreign substances, dressing the wounds with gentleness, covering them immediately with fine soft linen, and by refraining from dressing fresh wounds until the suppuration is well established; finally, the patient must be kept perfectly quiet. When tetanus is caused by a reflux of pus, blisters applied as nearly as possible to the wound, or immediately on the wound, will re-establish the suppuration. I shall here notice some cases of success:

Bonnet (Pierre) of the 85th demi-brigade, twenty years old, of a dry bilious temperament, had languished in the hospitals of Cairo since our campaign in Syria, with a fistulous and carious ulcer of the bones which form the articulation of the right foot with the leg. It was decided in a clinical conference, that, considering the disorganization of the foot, and the state of marasmus to which the patient was reduced, that amputation was the only means of saving his life. This was performed on the 21st of September, by M. Valet, a surgeon of the first class, under whose particular care he had been placed.

No accident occurred to prevent the success of the operation. Suppuration took place in the usual time, and the wound assumed a promising appearance. Ten days afterwards a cicatrix commenced at the circumference, and extended gradually to the centre.

On the twenty-fourth day after the operation, when the patient was considered as safe, he was suddenly seized with symptoms of tetanus, occasioned, no doubt, by the reflux of purulent matter in the wound.

Perspiration was also suppressed by the imprudence of the patient in walking out at night. Diaphoreticks and opiates, in strong doses, and dry frictions on the whole surface of the body, were used, by my advice; the symptoms continued notwithstanding to advance with rapidity.

The patient experienced intense pains in the epigastrick region, and insupportable twitching at the point of amputation. Respiration was laborious, and deglutition difficult; the jaws were closed, the head thrown forward on the thorax, the trunk bent, and, in short, the emprosthotonos was at its acme.

As opiates could no longer be taken through an opening occasioned by the loss of two teeth, we gave him anodyne emulsions and antispasmodicks, which immediately mitigated the pain at the stomach. A large epispastick was applied on the whole circumference of the stump, brought on a suppuration in the course of twenty-four hours, and produced a miliary eruption on the face and thorax. From this time the patient grew better; all the symptoms of tetanus declined gradually, his functions were restored, and on the fiftieth day after the operation, the patient left the hospital perfectly cured.

Grangie (Pierre), a carabinier in the twenty-first brigade of light infantry, was wounded in the arm, at the siege of Cairo, by a ball, so that immediate amputation was required. Nothing impeded the operations of nature, during the first days; suppuration was established, and the wound in a very promising state, when, on the ninth day from the amputation, after being exposed to the

damp night air, the patient was seized with tetanus. M. Lachome, surgeon of the second class, under whose care he was, knowing that the reflux of purulent matter was the principal cause of tetanus, hastened to apply cantharides to the wound, as I had done in a similar case with success. The patient was put on a diaphoretick ptisan; and a strong dose of opium and camphor, in a glass of emulsion, was administered to him. The symptoms, however, continued for four and twenty hours; but the blisters brought on suppuration; cutaneous perspiration recommenced, the jaws relaxed, and the patient was soon convalescent, and continued to improve, until his cure was complete

The unexpected and complete success that followed the amputation of a wounded limb of an officer, attacked by chronick tetanus, induces me to propose a quere, whether, in this disease, which arises from a wound in some part of the extremities,

"It is not better to amputate the wounded limb as soon as the symptoms of tetanus appear, than to rely on the uncertain resources of nature and art to effect a cure."

When tetanus is chronick, as it sometimes is, amputation may be resorted to in any stage of the disease, provided the operator choose a period when the symptoms intermit. It will not succeed as well in acute tetanus, if it be advanced, and the muscles of the limb to be amputated, be strongly contracted and rigid, as I had occasion to observe at the siege of Saint-Jean d'Acre, in the case of a soldier who was attacked by it, in consequence of a gun-shot wound at the joint of the left elbow.

Although I saw that the disease in this case was already far advanced, I thought proper to attempt the amputation of the arm: this was followed by a calm, which promised success; but being unable to defend the patient from the coolness of the nights, and the disease being far

advanced and very acute, the symptoms returned, and the patient died in three days after the operation.

May I not be permitted, without attempting to resolve the above important quere, to give some reasons that appear to me to corroborate my opinion in favour of amputation.

When it is well known that tetanus is caused by a wound, we ought not to have any hesitation in amputating immediately on the appearance of the symptoms. We may be assured that it is *traumatick*, by the nature of the wound, the progress of the first symptoms, and by considering the time of their appearance, which is from the fifth to the fifteenth day, or later. It appears that this is the period at which the nervous mobility is very great. When suppuration commences, the stupor is immediately removed, the vessels are unloaded, the eschars are detached, and the nerves become perfectly free: then, their sensibility is extreme, and they are susceptible, on the slightest impressions, of great irritation, which soon extends throughout the nervous system. If, under these circumstances the wound be exposed to the cold moist air, or should any foreign substance remain, and puncture the nerves that are separated from their eschars, tetanus is inevitable, especially in warm climates. We may then expect to see it advance rapidly, so that in a short time, all parts of the limb are effected, and all the nerves irritated. The effects of this first cause may also be increased by the presence of a taint of system, or by worms in the intestines, a case of which I saw at Nice: but, by observing attentively the phenomena of tetanus, we may easily distinguish the symptoms which characterize these slight complications, and treat them according to their indications.

Amputation of the limb being made on the first appearance of the symptoms, all communication with the

origin of the evil is cut off. This operation unloads the vessels, removes the twitchings of the nerves, and convulsive motions of the muscles. These first effects are followed by a general collapse, which promotes the excretions and repose, and re-establishes the equilibrium of the body.

The momentary pains caused by the operation, does not increase existing irritation; besides, the pain of tetanus render those of the operation more tolerable, and diminish their acuteness, especially when the principal nerves of the limb are strongly compressed. The following case supports these assertions:

M. Bonichon, lieutenant of the first battalion of the 21st demi-brigade of light infantry, entered hospital No. 1, on the 7th of October, 1798, on account of a gun-shot wound in the left foot, received in the battle of Sedment.

The wound extended obliquely across the tarsus, several bones of which were fractured; the extensor brevis of the toes, and the corresponding articular ligaments were lacerated. Notwithstanding this, on his arrival at the hospital, his situation was not very distressing: the first dressings were performed, sec. art., and the wound was opened, and some splinters extracted.

On the same evening the patient was restless, and his sleep disturbed; he experienced acute pains in the wound, which continued increasing until my visit on the next morning; the edges of the wound were tumefied, and surrounded by a reddish circle; suppuration was suppressed, and the dressing, although performed very gently, occasioned great pain; the patient was in a state of general uneasiness. Cooling drinks and anodynes, with emolhents to the wound, produced no good effects.

On the 19th of October, the jaws became rigid, and on the 20th, all the symptoms of tetanus were apparent.

The muscles of the wounded extremity were in a state of convulsive contraction; the abdominal parietes were retracted, deglutition difficult, and the patient constipated.

These symptoms continued to increase in a gradual manner, for the tetanus became chronick. An incision was made in the wound for the purpose of extracting some loose splinters that had escaped notice at the first dressing. Opium, in convenient doses, was prescribed. This seemed to allay the symptoms, which abated and returned alternately; but the intermission was of short duration: on the 2d of November, 1798, the disease was at its acme.

A convulsive contraction seized on all the muscles; the legs were rigid, and strongly bent on the thighs, and these on the pelvis; the parietes of the abdomen were thrown back on the columna vertebralis, the head thrown forward on the thorax, the arm and fore-arm bent on each other, the jaws strongly closed, and deglutition difficult. The pulse was small and tense; the patient was much emaciated, his body was constantly covered with sweat, and he suffered such violent and continued pains, that he wished for death to relieve him.

After trying, to no purpose, all the remedies afforded by the healing art, in such cases, such as opiates, in every form, united with camphor and quinquina, lotions of cold water, solutions of opium applied to the wound, emollient cataplasms, and finally cataplasms of tobacco; after trying all these means, I thought of amputating the leg. The distress of the patient, and the almost certain prospect of death, induced me, contrary to the advice of many surgeons whom I consulted, to attempt this last resource. I took advantage of a period of tranquillity.—The operation was dexterously performed before me and the consulting surgeons, by M. Assalini, surgeon of the first class. The patient, who was also desirous of the

operation, supported it courageously, and without much complaint. A slight syncope occurring a few moments after the operation, was the happy presage of the immediate cessation of the symptoms; in fact, the patient, in a short time, was able to swallow liquids. On the following night he was tranquil, and enjoyed three hours' sound sleep. On the next day I found his pulse full, the limbs less rigid, the jaws relaxed: he had already had a stool, with the assistance of enemata. Suppuration took place in the wound at the ordinary period, and all the symptoms gradually disappeared: the stump, however, suffered violent twitchings, for some days, the pains of which were aggravated by the slightest contact with foreign bodies, and especially by the dressing, notwithstanding the greatest precautions were taken not to irritate it. I put a stop to this convulsive motion by making a very exact compression on the course of the sciatick nerve.

His strength gradually returned; but the digestive organs remained for a long time in a state of atony, on account of the pressure which they had sustained from the muscular parietes of the abdomen.

In the month of December, this officer left the hospital perfectly cured, and began to walk on his wooden leg. A short time afterwards he departed for France, with a number of blind soldiers, to go into the *Hotel des Invalides*, in Paris.

The battle of the 21st of March, 1801, rendered it necessary to amputate the leg of a soldier, for a wound similar to that of M. Bonichon. Although tetanus of a very acute character had come on, the operation removed all the symptoms as by enchantment, and but for the dampness of the ward in which the patient was placed, and the want of proper means to preserve him from the coolness of the night, which was more than ordinary,

this operation would have had a result as fortunate as the former. He remained about twelve hours in perfect tranquillity, but the cold brought on the symptoms; they resisted all applications, and the patient died three days after the operation.

Destaing, gen. of division, in the same battle, received a ball which passed through the middle of the right arm, at the internal and posteriour part. A portion of the biceps, the coraco-brachialis muscles, and the radial and internal cutaneous nerves were cut. This wound left a bridge, formed by the integument, the cellular tissue, and some moveable fibres: its first effects were, the fall of the sabre from the general's hand, paralysis of the arm, and a painful tremulous motion through the whole extremity, accompanied by anguish, general debility, and difficult respiration.

It was with great difficulty that the general could be transported to Alexandria, where he received the first assistance from one of my colleagues. I was called in on the eighth day, at which time he suffered the most acute pain. Although suppuration had taken place, the patient's appetite was affected, and his sleep irregular, with febrile paroxysms towards evening. I perceived the necessity of dividing the bridge of the wound, which contained some nervous branches of the internal cutaneous; but the patient refusing to submit to the operation, I was obliged to content myself with the application of emollients, and such remedies as were indicated. I dressed the wound daily, until a cure was effected. On the next day the local pains were very great. He suffered from convulsive motions in the fore-arm and hand, heat of the whole system, and rigidity of the jaws. He was very restless, and in continual agitation. The rapid progress of the symptoms made me determine to cut this bridge, and make

incisions to the bottom of the wound, where I found some nervous or aponeuretick filaments.

This operation was painful, but in the course of two hours the patient was relieved, by means of anodyne emulsions, emollient enemata, repose, and regimen, the symptoms were removed in the course of two days. A laudable suppuration took place, the wound became clean, its edges sunk, and it cicatrized before the conclusion of the siege of Alexandria.

This wound left the fore-arm and hand paralysed; the third and fourth fingers were also, for a long time, deprived of sensation.

Although I regret that I cannot enumerate a greater number of successful cases after amputation, yet I must conclude:

1st. That of all the remedies proposed by skilful practitioners, experience has proved to me, that extract of opium, combined with camphor and purified nitrate of of potass, and dissolved in a small quantity of emulsion, made from the cold seeds or sweet almonds, and given in strong doses, acts most favourably; because the sick have a repugnance to all other liquids, while they take this mixture with pleasure; and that its effects may be seconded by venæsection, if necessary, and by vesicatories under such circumstances as I have before mentioned;

2d. That amputation performed at a proper time, is the most certain means of arresting tetanus, when it is produced by a wound in the extremities.

I wish that these cases may attract the attention of surgeons in the treatment of traumatick tetanus; that the success of an operation, of which I know no precedent, may encourage them to practise it, and by drawing them from a path in which they must expect to meet death at every step, they may be induced to follow that by which

it is yet possible to preserve the lives of many worthy citizens.

The result of these dreadful diseases, and the different combats, left us about a hundred and fifty maimed or blind, whom the commander in chief thought proper to send to France. They were put under the care of the commissary general Sucy, who was also an invalid. I sent with them three surgeons, whose eyes were affected: Messrs. Perdrix, surgeon of the second class, Daburan and Stouvenel, of the third class. A fatal destiny drove them on the coast of Sicily, where they perished.

Scarcely had I discharged them from the hospital, when, on the 22d of December, I received orders to follow general Bonaparte, with his etat-major, to Suez, where we arrived in three days, after traversing an immense arid plain, in which we saw but one tree, until we reached our second station; this was a yew, of a disagreeable odour and appearance. The road through this desert might be traced by the bones of men and of animals of every species. Had their carcasses escaped the eagles and vultures, who speedily dissect them, and leave their skeletons, the sands and burning heats would soon dry and convert them into mummies.

These golgothas inspire the traveller with the most melancholy ideas; for should he be in want of water or provisions, he feels, in anticipation, all the horrours of the fate which awaits him in the midst of a desert, the limits of which he cannot discern.

In this journey we felt the great difference of temperature between the day and night; during the latter the cold was so intense as to deprive us of sleep. It was necessary to walk, or by other means to keep in constant exercise, for as we fell asleep our limbs were benumbed. However, being directed by necessity, we collected the

bones, of which I have just spoken, into heaps, and made a fire of them. We had some difficulty in lighting them, but we succeeded, and thus were kept warm during the night.

Near Suez, we saw the ruins of two castles, with wells of brackish water, which could only be used to slake the thirst of the cattle.

We took possession of this town, so remarkable in ancient days, but now of little consequence.

At Suez, I established a hospital with fifty beds, for the garrison. The general, after examining the port and the town, and designating the points to be fortified, wished to pass into Asia, to visit the fountains of Moses, and to reconnoitre the eastern shore of the Red Sea, by the side of the mountains of Torn, from which quarter the vessels arrive. In order to avoid a circuitous route of seven or eight leagues, through fatiguing deserts, he crossed the sea before Suez, at ebb tide. Two Arabian guides, mounted on dromedaries, preceded us; we were protected by a wall of rocks and sand; we reached the opposite shore without accident. Many of our horses were obliged to swim, while crossing this arm of the sea. It is supposed that this is the place at which Moses crossed with the Israelites, in order to escape from Pharoah's army. After some hours' march, on loose sands, we arrived at the springs of Moses, a short distance from the sea, near the mountains of Torn. The water that flows from them is potable, and supplies the inhabitants of Suez, and travellers; it was also formerly used for the shipping, from an aqueduct which extended to the shore of the sea, and of which some vestiges are still to be seen.

We returned to Suez the same night. Some of our party took the land passage, and others crossed the sea. The latter route was not so favourable as it had been

in the morning, and several narrowly escaped being drowned.

After resting at Suez, we entered the isthmus, in order to visit the old canal which connects the two seas: general Bonaparte pursued its course to the ancient Pelusium, whence we returned to Cairo. We met in our route with some small tribes of Bedouin Arabs, almost naked, reclining on the sand; they presented a picture of extreme wretchedness. Many of them were covered with leprosy; a frightful disease which I shall hereafter describe.

On my return to Cairo, I completed the arrangement of the hospital staff under my care; and in virtue of an order from the commander in chief, I re-organized the hospitals, to suit them to existing circumstances. Preliminary instructions were given to the surgeons of different corps of the army, which ordered that the superintendance of the staff in the regiments and demi-brigades, should belong to the oldest in grade and service, in order to render their operations more precise, and to facilitate the correspondence with the chief surgeon.

I learned from Alexandria, Damietta, and Mansouri, that a pestilential fever attended with carbuncles, and buboes in the groin and axilla, had appeared in these cities and proved very fatal, especially at Alexandria, where many of the surgeons of the navy died during this year. Two or three cases of this nature had already appeared in Cairo.

These symptoms affected a soldier of the thirty-second demi-brigade, who entered the hospital with a blackish tumour on his lip; this tumour assumed, in a few hours, the character of a carbuncle, and destroyed the patient on the third day after its appearance.

The body was speedily removed, as it bore the appearance of legitimate plague, and I ordered that his ef-

fects and the furniture of his bed should be burned. I directed his chamber to be ventilated and fumigated. I communicated my opinion of this case to none but my colleague the chief physician. I was convinced that this soldier had died of the plague from other analogous cases which I had before seen when we arrived at Alexandria, from the correspondence of the surgeons of this town, and of those whom I had sent to Rosetta and Damietta. I addressed a circular letter to all the surgeons of the first class, the object of which was, to request them to attend, with particular care to individuals attacked by this disease, always taking precautions to prevent contagion.

Preparations were soon ordered for a campaign in Syria.

The officers of the medical and surgical staff assembled together, in order to make arrangements for this campaign. I took care to prepare every thing necessary for the relief of the wounded which might probably be numerous from an expedition so perilous and tedious.

The means of transporting them was the first object of my attention; for it was necessary not only to dress the wounded on the field of battle, but also to convey them beyond the reach of the Arabs, and to preserve them from the horrours of hunger and thirst, to which they would be exposed, if not promptly conveyed away; to this end, it was necessary to employ camels, the only means of conveyance which the country afforded, and to render the transportation convenient to the wounded, and to the animal. For this purpose I caused a hundred panniers to be made, two for each camel, disposed in form of a cradle, which the animal carried on each side of his dorsal projection, suspended by elastick straps. Their construction was such as neither to impede the progress nor motion of the animal: they were, however,

made of sufficient length, by means of a moveable foot-board, to carry a man while lying at full length.*

When these camels arrived at the frontiers they were unfortunately taken from me by the quarter masters, for their particular service, and we were much embarrassed in carrying our wounded.

I then organized light *ambulances*, to follow the divisions; and confiding the superintendence of my department, in Egypt, to M. Casabianca, surgeon of the first class, I set out with general Bonaparte and his etat-major. General Dugua was, in the interiour, charged with the command of Egypt and the encampment of Cairo.

SECTION III.

On the 9th of February, 1799, our divisions marched with rapidity through the province of Charqyeh. The advanced guard, commanded by general Regnier, on its arrival at El Arich, while reconnoitring the town and fort, had a smart action with the enemy in which nearly three hundred men were wounded. I received news of this at head-quarters, at Salehyeh. I asked permission of the commander in chief to detach myself from the main body of the army in order to repair thither. I set out with a party mounted on dromedaries, who served as an escort in the desert which we crossed in three days and nights. I performed this painful journey mounted on a dromedary, in company with M. Galli, one of my favourite pupils, who afterwards died of the plague at Caiffa, in Syria. We suffered much from thirst and fatigue.

In passing through Qatyeh, the first station and magazine of the army, I established a hospital of twenty beds

* See plates VII and VIII.

in a cottage made of palm, and confided the superintendence of it to M. Andre surgeon of the second class.

The troops and the sick were badly situated at this post, on account of the brackishness of the water, which was scarcely fit for the cattle to drink. During the short stay I made at this place, we received five or six sick men, from the division of Damietta, among whom was one with a pestilential carbuncle on the left leg. I separated him from the others, and recommended him to the particular care of M. Andre. I afterwards learned from the surgeon that he died with three others, who were affected with the same disease. I reached El Arich, on the 27th at night. The weather was wet and cold, the earth damp. The wounded were laid on beds of palm leaves, in the midst of the encampment of Regnier's division, and sheltered by some bad tents, or branches of the same tree, without being protected from the rain from above, or the humidity from beneath. Their wounds were severe, and almost all of them required operations, to which I proceeded, assisted by the surgeon major of the division and the surgeons of battalions, whom I requested to assist the surgeons of the *ambulances* on this occasion. Some of these operations, on account of the complicated nature of the wounds, were difficult and delicate: I shall mention them in another place; but, in general, they were successful. Although the French had not yet eaten the flesh of the camel, I requested general Regnier to allow them to eat it. My request was granted, and the general gave orders that the camels that were unserviceable, on account of their wounds, should be appropriated as food for the sick. The flesh of these animals boiled and roasted, was nutritious and not disagreeable to the taste. Unfortunately, this resource did not last long; for, in order to support the wounded whom we left in the fort of El Arich, we were obliged to sub-

situte horse-flesh to that of the camel, which latter is superiour in quality.

On the 28th, Bonaparte arrived before El Arich with his head-quarters, and the park of artillery. We besieged the fort, drew trenches round it, and battered it in breach. The besieged agreed to capitulate; and, after two days' negociation, they demanded permission to retire with the honours of war, which was acceded to on our part.

Some of our men were severely wounded in this siege, and were siezed with tetanus; they died, notwithstanding every possible attention was paid to them: as the rain continued all the time we remained before the fort, it was impossible to preserve them from the moisture to which they were a long time exposed.

As soon as the fort surrendered, the general ordered me to visit its interiour, and to take such measures as I thought proper to purify its apartments, and clean them of infection. An officer of the etat-major, who had thirty Turkish prisoners at his disposal, was to act in concert with me in the execution of this measure. I immediately examined whether any wounded and sick had been left by the besieged, and discovered fifteen in subterraneous caverns, deprived of light and air, laid on mats that were almost rotten, without bed-clothes, and covered with vermin. These unfortunate men had received no medical aid; in almost every instance their wounds were without dressings, gangrenous, and filled with animalculæ. Some of them presented all the symptoms of malignant fever: one of them had a pestilential bubo in the right side of his groin, and a carbuncle on the right leg.

These cases were sufficient to establish the existence of the plague in this garrison. Of this I rendered an account to the general. After removing these unfortunate

men under the fort, so that they could have no communication with our troops, I dressed them, and then proceeded to the second object of my mission. The courts of the fort were strewed with the dead bodies of men and horses in a state of putrefaction. The apartments of the soldiers were covered with a variety of substances calculated to produce disease. I commenced by having all the dead bodies removed to a great distance from the castle and buried. I then ordered the contents of the rooms to be laid in heaps and burned with the bedding. The whole fort was cleansed before our troops entered, and the rooms white-washed.

A convenient place was prepared for the wounded. M. Valet, under whose care they were placed, attended them, and they speedily recovered and rejoined the army, with the exception of some who died of the plague.

The army, finding only one or two days' provision in the fort, were again obliged to enter the deserts.

The first day was totally lost to us. The Arab guides led the advanced guard of Kleber, and the army which followed, into a wrong direction; so that after a forced march of eight or nine leagues, we found ourselves on the loose sands, about a league from the sea, and two leagues from El Arich. This was a circumstance which put the courage and the patience of our brave soldiers to the test. Some of them, worn out with hunger, thirst and fatigue, appeared discouraged; but no sooner had general Bonaparte, who shared their privations, and their fatigues, appeared among the battalions, mounted on his dromedary, than they were animated with new strength, and continued their route with the greatest firmness.

We soon reached the gates of Syria; which are two columns of granite, that mark the line of separation between Africa and Asia: here we observed some fragments of antiquity, and the deep and elegant wells of

Reffa, filled with sweet water, where we quenched our thirst, at our leisure. On the next day, we entered the rich countries of Palestine.

Kanyounes was the first place at which our troops halted for food and refreshment. From Kanyounes we went to Gaza; the distance is but seven or eight leagues, but the route was painful and difficult, on account of the torrents and rivers it was necessary to cross.

The army arrived before this town, and found Ibrahym Bey's mamelukes drawn up in order of battle on the hill which bounds this city. Arrangements were made for giving them battle; but the moment our cavalry moved to the attack, these select oriental troops took to flight, and did not stop until midnight, at a great distance from Gaza; we saw no more of them until the battle of Mount Tabor.

On this day we had one man wounded.

Gaza offered the keys of its gates and towers to the general. This city, so celebrated in antiquity, is surrounded by well cultivated plains and immense groves of olives.

My first care was to provide a suitable place for the sick and wounded. Continual rains and the moisture to which the men were exposed in bivouac, had rendered the number of the first pretty considerable.—Among the diseases, I observed one or two cases of ataxick fever, of a pestilential character. M. Dewevre, an intelligent surgeon, (one of the first victims of the plague,) was at this time charged with the direction of this hospital A few days after, Bruant was joined to him as a colleague. The latter took charge of those affected by the fever, and the former of the wounded.

After remaining in this city two or three days, general Bonaparte marched for Ramleh. We slept at Ezdoud, and reached Ramleh the next day. It is a small ancient

town, built with tolerable regularity, containing two catholick convents; one of which is of the order of capuchins; in this we established a hospital. This town is surrounded by plains covered with olive-trees, and some marshy ground. I placed this hospital under the care of M. Boussenard, surgeon major of general Regnier's division, who commanded the rear-guard.

On the evening of the 3d of March, 1799, we arrived at Jaffa, and laid siege to it. I established an *ambulance* near the trenches, on the declivity of a hill, which protected it from the fire of the ramparts, and a hospital in a village a league distant, as a place of safety for the sick. Subdivisions of *ambulances* were placed at the principal points of the intrenchments. During the siege, we had many men reported as sick, and about thirty wounded. Among the sick of the thirty-second demi-brigade, many died very suddenly. M. St. Ours, surgeon major of this demi-brigade, in my presence pointed out blueish tumours in the groins of several dead bodies, and gangrenous petechia in others. This confirmed my opinion of the existence of pestilential fever, and I made my report accordingly.

I shall dispense with a detail of the horrours which attend the assault and sacking of a city. I was a mournful witness of those of Jaffa, which place was carried on the 7th of March, after an obstinate contest of several hours. Two hundred and forty-two of our men were wounded at the taking of this town, besides those engaged in the siege.

I operated on and dressed the wounded, near the breach. Many of them underwent severe operations which were attended with all the success that could be expected. I shall detail some of them, in another part of this work. I had all the wounded transported to a large convent, which formed hospital No. 1, and I entrusted

the direction of it to M. Rozel, surgeon of the first class, who assisted me on this occasion with great zeal. A second hospital, for those affected with the fever, was established the next day, in another convent.

I also attended to twenty women who were wounded at the sacking of Jaffa, and repaired daily to the hospital to have their wounds dressed.

During the few days the army remained in this place, many cases of plague occurred among the wounded, and a large number of the feverous cases were also complicated with it. Every possible precaution was taken to prevent the spreading of this disease, and preserve ourselves from it. All the troops went into *bivouac* near the town, and were advised not to wear the clothes of the Turks.

Jaffa is built with tolerable regularity, in the form of an amphitheatre, on a hill near the sea, inclosed by a simple rampart, and flanked at its angles by towers. It is surrounded by magnificent gardens, and groves of orange, citron, and all kinds of fruit-trees known in Europe.

The army laid in provisions at this place, and marched for St. Jean d'Acre on the morning of the 15th of March, 1799. In crossing the mountains of Palestine, we met several legions of the enemy, with whom general Lannes's division had some engagements. We had fifty-five wounded, whom we carried to St. Jean d'Acre, where we arrived, not without much difficulty, on account of the deep roads, rugged mountains, and marshy valleys which we were obliged to pass. On the evening of the 18th of march, however, we encamped at the foot of a ruined castle, at the entrance of the plain of St. Jean d'Acre, from which place we had a view in front of the town and the road; on the left we beheld Mount Car-

mel, and on the right, the famous plain of Esdrelon, Mount Tabor, and the mountains of Chefamer.

The troops were much fatigued, deprived of every kind of food, and without hopes of obtaining any on the morrow. The inhabitants fled at our approach and took refuge in the mountains; we had yet some wounded and sick, whose situation was critical; some of them had even died on the passage, of the plague, in a sudden and alarming manner. We advanced into the plain, winding round Mount Carmel, as far as Caiffa, a small town, situate near the sea, on the western angle of this mountain. Here we found a small quantity of provisions, which were distributed to the army and the sick. From this place the troops retrograded, in order to follow the chain of mountains which bounds a great part of the circumference of the plain, in order to avoid the miry soil, which at this season is impassable, and reached Acre, after surmounting the greatest obstacles. A river which descends from Lake Cherdan, intersected the road to the town, and rendered its access difficult. It was necessary to construct bridges for the passage of the artillery and infantry. After reconnoitering, the commander in chief encamped his army on the brow of a hill, which protected them from the batteries of the ramparts and the vessels in the road. On the 20th of March the siege commenced, and the trenches were opened the same day.

St. Jean d'Acre is a city tolerably large and of a solid construction; it is inclosed by a double rampart, fortified at regular distances, by bastions and towers of different sizes, the strongest of which flank the angles.—This town is situated on a peninsula, so that the sea washes three-fourths of its ramparts: the neck of land which connects it with the continent, is intersected by a very deep trench, filled with water.

At the distance of about a hundred toises from this place, are seen the ruins of ancient Acre; fragments of columns, *entablatures* of marble, and other remains of magnificence. There are also a great number of granite stones, a foot or more in diameter, which the ancients threw against the walls, by means of machines, for the purpose of battering them down. Between Acre and Caiffa, which are on parallel lines, is a road of great depth and semi-circular form, with good bottom for anchorage of vessels. The plain which surrounds it, has the appearance of an elliptical basin; it is about five leagues in length, and three a half in breadth. It is bounded on the west and south by the road and Mount Carmel; on the east, by the mountains of Chefamer and Nazareth; on the north by the sea, from which it is separated by an irregular bank, on which our army encamped, that ends in a point on the road to Sour, the ancient Tyre, at a short distance from Acre, where may yet be seen the ruins of that ancient and celebrated city.

The mountain torrents and the abundant rains inundate this plain during the winter: they remain a long time, and form lakes which are never drained; from these spring two or three small streams, whose waters hold in suspension, and perhaps in solution, a considerable quantity of silex, which renders them very insalubrious; they cause violent colicks, diarrhœas, and predispose to putrid nervous fevers. Many of our soldiers were much affected by them.

The violent heats of summer evaporated the waters of this plain: thick mists were exhaled, which were rendered very insalubrious by the quantity of animal and vegetable substances contained in the waters. Men breathe with difficulty in this atmosphere, and there is no doubt that these exhalations, that are more abundant during the prevalence of the south-east winds, contributed

not a little to the production of contagious diseases. This plain in summer, affords abundant pasturage of a bad quality.

The army having taken military positions, I was engaged with the chief physician in establishing hospitals. The principal one was established in the stables of Djezzar, the only place in the environs of Acre, in which we could protect the sick and wounded from the inclemencies of the weather. A deep brook which ran alongside of the camp, and an arm of the sea, which separated it from the town, rendered it secure from the sallies of the besieged: this was the only advantage afforded by our situation. In addition to this we were obliged to place the wounded on rushes, which could not be changed at pleasure, while most of them were without covering, or any other sort of bedding. We were likewise in want of wine, vinegar, and medicines.

We afterwards established two hospitals as places of retreat for the convalescent, one in the castle of Chefamer, and the other in the hermitage of Mount Carmel; a third, for the reception of those who were removed, was opened at Caiffa.

The trenches were opened on the 21st of March, 1799, and the works were continued with the greatest activity until they approached the ramparts.

At the most favourable point, about thirty toises from the town, I placed an *ambulance* for the purpose of giving the earliest assistance to the wounded. Most of the surgeons of the army and of the hospitals performed duty here in turn. But I superintended the service during the assaults on the town, and the engagements which resulted from the frequent sorties of the besieged. On the first days, the army suffered from hunger; but in a short time the Druses and Matoualis, a warlike, active and humane people, learning our good intentions, brought us

provisions of all kinds; and we were enabled to bake our own bread.

The frequent occurrence of contagious fever in the battalions, and the various modes of treatment adopted by the surgeons of these corps, together with other reasons relative to the surgical service of the advanced posts, induced me to issue, on the 22d March, the following circular.*

"*Head-quarters, before St. Jean d'Acre, March 22, 1799.*

TO THE SURGEONS OF THE ARMY:

"GENTLEMEN—I beg you to report, every fifth day, the number of sick in your respective divisions; the character of the reigning disease, its progress and termination: this information is necessary to enable the chief officers of the surgical staff to make out such reports as are required by general Bonaparte.

"Experience has taught me, that vomits, administered at the commencement of the disease, provided there be no sanguineous turgescence, produce good effects. When this is the case, they should be preceded by the application of cupping-glasses to the back of the neck, or to the lateral parts of the thorax, from which more or less blood must be drawn, according to the plethora of the patient; but remember, that general bleeding is almost always fatal in this disease. When the prima via is evacuated, it is necessary to put the patient upon the use of a ptisan, acidulated with the citrick or acetous acid, to keep the bowels free, and to continue, during the first twenty-four hours, the acidulated drinks.

"I have observed that when the cortex is scarce, a decoction of the bitters which are found in great abundance

* Extract from my correspondence, No. 313.

in this country, taken in large doses, in the second stage of the disease, and followed by suitable topical applications, generally cure the patients, provided it be possible to effect this object.

"The topical applications should be varied, according to the nature of the external symptoms. If these are buboes, it will be necessary to assist nature by every known method, to excite suppuration, by stimulants, rubifacients, or caustick: cataplasms of the *scilla maritima*, which abound in this country, may be applied warm, and of *tithymalus aizoides* (euphorbium), which is no less common, and you may, by these means, economize the cantharides of which but few remain.

"When inflammation takes place with difficulty in the buboes, the actual or potential cautery must be used; and if a collection of matter form, it must be immediately evacuated by a large incision, and the wound dressed with styrax or theriaca; it is also necessary to support the strength of the patient by bitters and coffee. These means assist the critical or exanthematick eruption, which usually takes place between the seventh and ninth day.

"If, instead of buboes, pestilential carbuncles appear, which you will easily distinguish from other tumours, it will be necessary to scarify them deeply, to remove the eschars as deep as possible, and to apply immediately, in the incisions, some concentrated acid, or if it cannot be obtained, the juice of the *tithymalus*.

"This disease, when it has arrived to a certain stage, is contagious; therefore it is necessary to take proper precautions for guarding against it; it is also necessary to make the soldiers, whose health is commited to your care, observe these precautions, without informing them of the motives: the most important of these are, cleanliness, frequent ablution of the body in cold water, and in vinegar, to wear clean linen and other clothes, re-

gular exercise, and regimen; it is also proper to proscribe the use of the Turkish pelices; and above all, to convince the soldiers that sleeping in the holes which they dig in the sand is very pernicious.

"This disease ceases during the prevalence of the cool winds from the north, but returns with the south wind or khampsin.

"You will all perceive, Gentlemen, the necessity of arresting the progress of this disease, which has already carried off so many of our brave companions. I hope that you will neglect nothing that can second my efforts, in the attainment of an object so desirable.

"After an engagement, I request you will assist the surgeons of the *ambulances* indiscriminately, with the zeal which you displayed at the capture of Jaffa, in dressing those who may be wounded during the siege or capture of St. Jean d'Acre."

I have thought proper to insert after this circular, the order of the day which was issued on the subject of the last article of my circular. This order points out the responsibility of each of the superiour health officers:

Extract from the order of the day, April 11, 1799.

Camp before St. Jean d'Acre.

"Art. I. All the health officers of the different corps when the attack commences, will repair to the central *ambulance*, there to be at the disposal of the chief surgeon.

"Art. II. The chief surgeon of the army will attend to the execution of this order, and inform the chief officer of the etat-major, if any one neglect to conform to it."

Signed ALEX. BERTHIER.

A correct copy,

Adjutant general BOYER.

When the trenches were sufficiently advanced, we battered a breach in the large tower, and bombarded the city. This attack was terrible to the besieged; and had the breach been practicable, we should have easily possessed ourselves of the place, but the first grenadiers who entered it, found it impracticable towards the city; they were assailed by a shower of balls and stones, and were all killed.

The want of success in this first assault, was an unfortunate presage of all the others; the besieged were encouraged, our ammunition was expended, and it became necessary to make new preparations. In the interval, the enemy captured our heavy artillery, on its passage by sea from Jaffa.

During the first days of the siege, a detachment of English troops made a descent upon Caiffa, whence they were vigorously repulsed; in this affair, we took fifty prisoners, of whom ten were wounded; to these we gave the necessary assistance. General Kleber, with his division, defended the defiles and passes of the mountains leading to Nazareth. His general of advanced guard, Junot,* in a defile near this town, which was the route to the plain of Acre, checked the army of the enemy, and repulsed them with three hundred men: the combat was brisk, but terminated very happily for us. In this affair, which may be compared to that of Thermopylæ, we had twenty wounded and some killed, among whom was Desnoyer, chief of brigade.

General Kleber, who watched these movements, perceived that the troops that were assembled in the plain of Esdrelon, near Mount Tabor, took an imposing attitude, in order to wind round the mountains, and come to the assistance of the besieged. Their number was consider-

* Duke of Abrantes.

able; they consisted almost entirely of cavalry, headed by Ibrahym Bey's mamelukes.

Kleber, in order to prevent this junction, descended the mountains with his phalanx, for the purpose of attacking them in the middle of the plain. But as he found himself much inferiour in numbers, he informed general Bonaparte of this new manœuvre of the enemy, and requested his assistance. The commander in chief attended in person with a portion of his troops, and after two days' forced march, at four o'clock P M. we joined Kleber's division, which had been engaged with the enemy since morning. Hemmed in on all sides by clouds of soldiers from the various tribes of Syria, his ammunition nearly exhausted, he was on the point of being overwhelmed by numbers, when general Bonaparte gave the signal for a charge, his light troops and cavalry rushed with impetuosity upon the enemy, who fled to the mountains: some were cut to pieces, and the rest escaped under cover of the night: but general Murat with a detachment of cavalry, met them at the passage of the Jordan, and destroyed the greater part of them.

In this battle we had about a hundred men wounded, whom we sent to Nazareth, and placed in the convent of Terra Santa, where we had established a hospital. Among those severely wounded were some remarkable cases, which I shall mention under the article "on wounds." I confided the direction of this hospital to M. Millois, surgeon of the first class, who superintended the *ambulance* of Kleber's division. The troops returned to St. Jean d'Acre. After visiting Mount Tabor, at the foot of which the battle took place, general Bonaparte turned off from the main road, to visit Nazareth, to which place I accompanied him. We were obliged to travel over rugged and difficult roads. At this town I

visited the convent of the capuchins and some antiquities which are yet preserved, of the ancient Nazareth. The church of this convent, although modern, is remarkable for its fine architecture, and the sculpture of the altar, of Parian marble; behind it is a grotto, cut in a rock, in which they assured us, the Virgin Mother was concealed twenty-one months.

Nazareth is favourably situated in a defile of a chain of mountains that separates the plain of Esdrelon from that of St. Jean d'Acre. It is well built, and surrounded by magnificent scites, and watered by a winding stream which flows from a fountain of clear and potable water. Here we met with good provisions and wine. The inhabitants are very hospitable. General Bonaparte was regarded as a second Messiah, and was received with the most extravagant enthusiasm. From this town we descended the mountains: after passing through several villages, thickly inhabited, surrounded by a variegated and fertile country, we arrived before Acre on the second day after our departure from Nazareth.

I was impatient to return to camp and examine the wounded, in whose fate I was much interested, and in particular for general Caffarelli, whose arm I had taken off some days before our departure for Mount Tabor. I was satisfied with his state; the wound began to cicatrise, and every appearance gave me hopes of his cure; but some unfortunate circumstances interrupted the operations of nature, and rendered all my cares unavailing. I shall hereafter detail this case.

General Bonaparte ordered the preparations for the siege to be continued, and determined on a third assault, which was made two or three days after. This attack was to have been preceded by the explosion of a mine which would have sprung the grand tower that was already partly demolished; but this mine was discovered,

and the enemy pushed their works as far as our first line, in such a manner that brisk skirmishes took place every day between them and our troops. It became necessary to change our measures and multiply our operations, which increased the number of the wounded and the labours of the soldiers. The disease already mentioned made great progress; nevertheless, as it was important to take the city, new assaults were successively made, until they amounted to thirteen. It may easily be imagined, (to say nothing of the vicissitudes of the atmosphere and the insalubrity of the soil of the plain of Acre,) what we had to suffer, during the siege of this city. I did not enjoy a moment's repose. I was incessantly in the *ambulances* or running from the camp to the trenches, and from the trenches to the hospital, or busied in going through the divisions, where we had almost as many sick and wounded as in the *ambulances*. We had about two thousand wounded in this siege. In general the wounds were severe, sometimes three near each other. Seventy amputations were performed; two of which were at the articulation of the os femoris with the acetabulum; the first, of which I shall speak in another place, on an officer of the 18th, gave me the greatest hopes of success, when the patient was seized with the plague, which carried him off; the second, on a soldier who afterwards died from the violent shock, occasioned by a ball.

Of six amputations of the arm at the scapular articulation, four were perfectly successful; the two others were followed by death, from the concussion of the ball.

Of seven trepanned, five were cured, two of these operations were on the sinus frontalis.

General Caffarelli, previous to the third assault, was struck by a musket-ball from the ramparts, which fractured the articulation of the left elbow; all the articular surfaces were broken up, the condyles of the humerus

separated by a longitudinal fracture, the olecranon entirely detached, all the ligaments were torn, the insertions of the tendons and the aponeuroses wounded or torn asunder. In addition to this there was an injury of the whole limb, and of the organs of the abdomen, and of the thorax caused by the violent concussion of the ball, and the fall of the patient which took place at the instant he was wounded.

This wound required amputation of the arm: the general himself requested it. After the operation, the pains soon abated, and the wound was healing rapidly, when, on the thirteenth day from that of the operation, he was siezed with all the symptoms of nervous fever, occasioned, no doubt, by the coolness and dampness of the nights, the insalubrity of the camp, and other causes foreign from the operation. The symptoms made rapid progress: the wound of the stump was still, however, in a good state, reduced and surrounded by a considerable cicatrix, but there was no suppuration. On the nineteenth day from the operation, the general died.

On opening his body, which was done in the presence of the chief physician, Desgenettes, who had also assisted in the treatment of his disease, a purulent abscess was found in the substance of the liver, and another of considerable size in the left lobe of the lungs with an effusion in the thorax. It is very probable that this internal disorder was occasioned by the shock which these organs had undergone, and by a bilious idiosyncrasy.

Sanson, chief of the corps of engineers, fortunately escaped tetanus, by which he was threatened from the effects of a gun-shot wound in the thumb: a complete section of the wounded nerves and aponeurotick portions removed the symptoms and re-established the tranquillity of the organs.

M. Duroc,* first aid de camp to the commander in chief, had nearly died from an enormous wound in the right thigh, caused by the bursting of a bomb, which carried away a great portion of the integuments of the thigh, near its external side, the aponeurosis and fascia lata. Many nervous branches were wounded and the crural vessels laid bare. Excision of the ragged portions, dilating the wound and the division of the parts strangulated or distended, gentle dressings, and the most assiduous care, prevented the fatal effects which appeared likely to ensue, and perfected his cure.

Aid de camp Beauharnois† was in very great danger; a ball which he received by the side of his general, wounded the orbit of the eye and the skin of the forehead. He was soon cured.

General Bon was not so fortunate: he died from the effects of a ball, which entered the pelvis, wounded the bladder and the sacral nerves.

General Lannes was wounded, by a ball in the face which buried itself behind the ear. I immediately dressed the wound. The ball being detached by suppuration from the surface of the bone, was easily extracted; the patient soon recovered.

M. Arrighi,‡ aid de camp to general Berthier, received a wound which cut the external carotid artery at its separation from the internal as it passes to the parotid gland. His fall, and the copious stream of blood which issued from these two openings attracted the attention of the cannoniers. One of them,§ a very intelligent man,

* Duke of Frioul, grand marshal of the palace.
† Vice roy of Italy.
‡ Duke of Padua.
§ M. Pelissier in the cavalry chasseurs of the imperial guard, and who was himself the subject of a remarkable surgical case.

had the presence of mind to put his fingers into the wounds, and thus stopped the hemorrhage. I was immediately called, and went to his assistance, in the midst of a shower of bullets. A compressive bandage methodically made, to my astonishment, arrested the rapid progress of death and saved this officer. This is the only well authenticated case in which a similar wound has been cured. Many other remarkable wounds occurred during this memorable siege; yet, notwithstanding the deficiencies of medicines, and notwithstanding the insalubrity of the camps, these wounds generally passed through their different stages, to the period of cicatrization, without any remarkable symptoms. During the progress of suppuration, the patients were only troubled by worms or larvæ of the blue flies common in Syria.

The hatching of the eggs, which these flies constantly deposit in the wounds or dressings, was assisted by the heat of the weather, and by the quality of the dressings, which were of cotton, which alone could be procured in this country.

The presence of these insects in the wounds, appeared to accelerate their suppuration; but they caused a disagreeable pruritus, and obliged us to dress them three or four times a day. They are produced in a few hours, and increase with such rapidity, that in the course of a night, they grow to the size of the barrel of a small quill. It is necessary, at each dressing, to use lotions of a strong decoction of rue with a small portion of sage, which destroys them; but they were soon re-produced for want of proper means to prevent the approach of the flies and to destroy their eggs.*

* Although these insects were troublesome, they expedited the healing of the wounds by shortening the work of nature, and causing the sloughs to fall off.

All the wounded were carried to Egypt; either during the siege or at the departure of the army: eight hundred crossed the deserts, and twelve hundred went by sea, the greater part of whom embarked at Jaffa. On either route we fortunately lost but a small number.

These honourable sufferers owe their preservation principally to general Bonaparte, and with the heroick virtues of this great man, posterity will admire this act of humanity in their behalf.

General Bonaparte ordered that all the horses belonging to the officers of the etat-major, without excepting his own,* should be employed in transporting the wounded, who must otherwise have been left to perish with hunger and thirst, or by the Arabs. Each demi-brigade being charged with the care of the wounded belonging to it, they arrived safely in Egypt, and I had the satisfaction of seeing every one of the wounded brought from Syria.

It will no doubt seem surprising, that with a few hard buiscuit, and a little sweet water apportioned to each patient, with brackish water for their dressing, a very great proportion of them with severe wounds in the head, breast and abdomen, or deprived of a limb, passed a desert of sixty leagues extent, which separates Syria from Egypt, without an accident, and even with such advantages, that the greater part were cured when they reached this country. The change of climate, exercise, direct or indirect, the *dry-warm air* of the desert, and the joy that every one felt on returning to a country, which, under our peculiar circumstances, and on account of its great resources, had become equally dear to us as our own;

* The commander in chief and the whole army marched a long time on foot.

were the causes which appear me to have produced this happy result.*

M. Costaz,† a member of the Institute of Egypt, who performed the campaign in Syria with us, and witnessed

* The record of this fact is of much importance, inasmuch as it indicates the causes which produce inflammation on the surfaces of wounded cavities, and in parts which have been extensively divided by incision. Until lately, the prevailing opinion was, that inflammation under such circumstances was caused by the presence of atmospherick air, which stimulated the part. Mr. Hunter, observing that inflammation did not follow emphysema, in which even *impure* air had been applied extensively to internal surfaces, concludes, "that it is not the admission of air which makes parts fall into inflammation, but that the *stimulus of imperfection*, which is the consequence of a wound, produces inflammation."* Mr. Abernethy attributes the inflammation which occurs in cavities that are laid open to "the *frequent* renewal and *long continued* application of air to a surface unaccustomed to it.†

John Bell accounts for the rapid progress of inflammation in wounded cavities in another manner, "it is plain that inflammation, or the absence of it arises, not from the presence of air, but from the length of the incision, &c. How then does it come to pass, that no inflammation has followed the admission of air to the delicate membranes which line cavities, or on its *frequent* renewal and long continued application to these surfaces, even when labouring under the additional "stimulus of imperfection" from "extensive incisions?" This question remained without a satisfactory solution, until the year 1804, when our countryman, the late Dr. James Cocke,‡ in his inaugural essay published at Philadelphia, first advanced a written opinion, that the inflammation which supervened on the surfaces of wounded cavities, was the consequence of the *change and diminution of temperature*, caused by the admission of air into them. That the vessels were first debilitated by the abstraction of their natural heat, which according to the laws of

† Baron of the Empire, &c.

* Hunter on the Blood, vol. 11 p. 98.

† Essay on Lumbar Abscess, p. 55.

‡ At the period of his death, Professour of Anatomy in the University of Maryland, a gentleman who was an ornament to his profession and his country.

our operations, confirms this, which he regarded as a kind of miracle, in his journal No. 30.

The inspector general Daure, an officer equally active and intelligent, gave me great assistance, especially in

calorick, was conducted off by the air at a lower temperature; and that they afterwards took on an increased action, and inflamed. With the part of Dr. Cocke's opinion, relative to the manner in which the debility of the vessels is produced, we most fully coincide and acknowledge its great and practical importance, but we are induced to differ with him in his opinion of the subsequent *increased action* of the debilitated vessels, while on this point we fall in with the opinion of Dr. Lubbock and Mr. Allen, advanced at Edinburgh in 1790, (although, I believe, never published by them). This opinion goes to disprove the increase of action in the vessels of an inflamed part, and to prove that inflammation depends on a debility or want of a due proportion of strength in the vessels of an inflamed part, rendering them unable to resist the vis a tergo, or power with which the heart propels the blood and enlarges them, producing increased heat, redness, &c. The effect is the same whether the vessels be *absolutely* or *comparatively* weak.

The inferences to be drawn from the latter opinions are:

1st. That in proportion as the temperature of the air which is admitted into cavities, or to wounded surfaces, falls below 98 degrees, so will be the abstraction of heat, the debility of the vessels, and the severity and danger of the inflammation.

2d. That in order to prevent inflammation on the surfaces of wounded cavities or divided parts, we should bring the temperature of the atmosphere in which the patient is kept, as near can be done with convenience, to ninety-eight degrees of Farenheit. We are already in possession of a number of facts, several of which have come under our own immediate observation, that give much support to the opinion of Dr. Cocke, on the predisposing cause of inflammation, and to the opinion of Mr. Allen on its exciting cause; and we are also pleased to find in this and many other passages of our author, such strong and corroborative testimony in favour of opinions which not only involve the proper management and safety of patients, after important operations, but in many inflammatory diseases, more particularly in such as affect the throat, trachea, lungs, &c. We are of opinion that the *dry warm air* of the desert was sufficient to produce the favourable results that

our difficult embarkation at Jaffa, where his zeal and humanity were conspicuous.

The advice and sage counsels of Messrs. Monge and Berthollet were very useful to me in concerting measures for preserving the health of the soldiers.

But I owe the greatest praise to all my co-labourers, for attentions which they bestowed on the wounded, during the siege of St. Jean d'Acre, and during their removal to Egypt: they have high claims on the national gratitude for their zeal, their courage, and their devotion.* Many finished their career gloriously, in this memorable campaign; some of them were killed by my side; others died of the plague, which they had contracted in the hospitals.

Previous to our departure from Syria, a great number of the wounded were attacked by this dreadful disorder, just as their wounds began to cicatrize; whereas it scarcely ever happened that one of them was seized with it, while in full suppuration: this has been observed by other surgeons of this army who have written on the subject.†

I have also remarked that the Europeans who are established in Egypt and in Syria, preserve themselves from this scourge, or at least suffer little from it, by keeping setons, or artificial drains constantly discharging. Persons habitually affected with herpes, or other cutaneous eruptions of this nature, are generally exempt from the plague. Some experiments made at Constantinople seem to prove that vaccination is a preservative against it.

are by our author attributed to the co-operation of other causes.—Tr.

* Messrs. Millios, Boussenard, Valet, Galand, surgeons of the firs class; Zink, Reynaud, Doueil, Latil, of the second class; and Dieche, surgeon major of the guides, who returned with me to France, distinguished themselves.

† Vide *An Essay on the Plague*, by M. Boussenard, surgeon of the first class.

Although this disease has been fully described by the physicians of the army of the east, I shall repeat in this place, what I have already said to the board of health of the armies, in the report that I addressed to them from Cairo, on the 28th of June, 1799, after submitting it to several of our physicians. This paper was the first that appeared from actual observation of the plague in Egypt, and may be found in the archives.

Experience having since taught me, that the phenomena succinctly described in that report, have been uniform in their character, and that the means which I then advised, have been employed with the same success; I shall again enumerate them here, with some additions which have arisen from observations that I have since made. I shall particularly detail the means which surgery has adduced to combat this disease. For the history and rational theory of the plague, the interesting works of the chief physician Desgenettes, Messrs. Pugnet, Savaresy, Sotira, and Boussenard, physicians of the army of the east, may be consulted.

MEMOIR

On the Plague which prevailed in the army of the East, during its expedition into Syria.

The pestilential fever had already attacked some soldiers at Quatyeh, at El Arych, and at Gaza, while the army was passing through those places, on its way to Syria, but did not exhibit itself in a positive manner, until its arrival at Ramleh. During the siege of Jaffa, many soldiers, apparently well, died suddenly of the plague; and, after the capture of this town, it prevailed with such malignity, that, during our stay there, the deaths were from six to twelve, and even fifteen a day. This disease

abated for some time, but appeared again with more violence, and did not leave the army until the siege of Acre, where it prevailed to a great extent.

The following are the principal phenomena which I observed at its different stages, in all the cases that came under my notice:

The patient languishes for some time in a state of inquietude and general indisposition, which prevents him from remaining a single moment in one position. He becomes indifferent to every thing; the appetite for ordinary food is lost; he feels, at first, a desire to use stomachick liquors, such as wine or coffee: he experiences a difficulty in breathing, and seeks in vain for pure air. To this anxiety succeeds general debility; dull pains in the head are the next in succession, principally beneath the sinus frontalis, and at the articulations of the limbs; all the cicatrices become painful; he is often affected with colick; irregular rigours are felt over the whole of the body, and particularly in the inferiour extremities; the face is discoloured; the eyes are dull, suffused with tears, and without expression; the excretions are suspended; he complains of nausea, and a desire to vomit, and sometimes throws up matter, at first slimy, and then bilious. In this first stage, the pulse is small and quick; some hours after the invasion of these symptoms, a general heat is felt, which appears to be concentrated about the precordia; the pulse rises, and is accelerated; the surface of the skin is parched, and becomes covered with a viscid matter. The pains of the head increase, and produce vertigoes; the eyes are haggard, the sight affected, the voice enfeebled: the patient grows drowsy, and experiences, at intervals, involuntary contraction of the muscles of the limbs and of the face. The fever then commences; delirium takes place sooner or later, and, in some instances, renders the patient furious. I have

seen some men affected by this complaint, at Acre, run through the fields, and then into the sea up to their waists; and after the most violent exercise, return to their beds, or, perhaps, overcome with debility, they fell down and died immediately. Delirium often comes on at the same time with the fever; its duration is proportioned to the strength of the patient: sometimes it terminates with life in a few hours; at other times it continues twenty-four hours, or even two days, but seldom extends to the fifth day, unless it be very mild. This may be called its inflammatory stage; soon after, the excretions re-commence, especially the stools, which degenerate to diarrhœa or dysenterick flux: the blood which the patient voids is black and fetid.

Tumours arise on the groin, arm-pits, and other parts of the body called *buboes*, but they never attack the texture of the glands, but generally appear beneath it, or in its vicinity.*

* Experience and examination have confirmed this fact, that the plague, or rather the bubo produced by it, never attacks the texture of the lymphatick glands; it is at the apertures which form the communications between the principal cavities of the body and the extremities, where the cellular tissue forms aponeurotick and nervous adhesions, that the deleterious humour appears to produce a focus of irritation, whence results the bubo; no doubt because the expulsive powers are weakened by being at a distance from the centre of animation, and in these parts meet with obstacles that are difficult to overcome.

It is thus that abscesses are formed in the inguinal and axillary regions, where the cellular substance which communicates with the thorax and abdomen, receives very strong aponeurotick ligaments. The morbifick principle stops at these parts and raises buboes, which I have seldom seen formed elsewhere. Sometimes the pus dissolves the cellular texture of the inguinal region, insulates the glands and exposes them to view, without changing them; even the cicatrices remain below the groin, and they cannot be mistaken for those of venereal buboes. After these facts we must consider the term "*adero-nervous*," which a celebrated physician of our day has given to the plague, as improper.

When they come forward at the commencement of the disease and terminate in suppuration, they appear to produce a favourable crisis. In some cases numerous carbuncles are formed, on the face and extremities.

When the disease suddenly appears, and there are neither buboes nor carbuncles, there are spots of a lenticular form; first red, then brown, and afterwards black: (these are petechiæ,) they frequently extend, communicate and form carbuncles. This second stage may be called the *exanthematick*.

This disease presents many anomalies; sometimes it is unfolded in a sudden manner, produces alarming symptoms, and carries off the patient in a few hours. I have seen a serjeant major of the 32d demi-brigade, twenty-three years of age, of a robust constitution, die of this disease after only six hours' illness. When it is thus violent, no external symptom appears; but at the instant that death takes place, or a few minutes after, the body is covered with gangrenous petechiæ.

In the majority of individuals, for whom I have had occasion to prescribe, with this disease, it has been more moderate in its progress. The pain of the head, debility, nausea, and vomiting took place during the first twenty-four hours, the fever abated on the second day; the buboes then appeared; they were followed by inflammation and suppuration, the symptoms declined about the fourth day, and insensibly disappeared: If the buboes did not suppurate, all the symptoms made rapid progress, and the patients died between the third and fifth day.

In cases in which the disease was of short duration, death was preceded by the most alarming symptoms. I have seen many die in this state. If the patient were marching, he fell into convulsions and violent distortions of the face; the lips opened and were distorted, and the

tongue tumified to such a degree, as to be forced out of the mouth; a thick fœtid saliva flowed involuntarily; the nostrils were dilated and discharged a mucus of a sanious appearance and fœtid odour. The eyes were opened; they seemed to project from their sockets, and were fixed. The skin of the face was discoloured; the patient writhed, uttered some mournful cries, and expired immediately.

Death presents a less frightful aspect when the disease has continued long, and the constitution of the patient is enfeebled and debilitated. The plague generally attacked young men or adults; rarely those of an advanced age. Men of a phlegmatick temperament, and those who were corpulent, were more exposed to it; while those of a dry temperament generally escaped.

It appeared that the force of its contagion was exerted principally on the cerebral and nervous systems; and that from its intensity, the organs of sensation and motion were deprived of their functions. I remarked that those of digestion were first and most severely affected: it also quickly formed saburræ in the prima via, and thus rendered the disease more complicated. This third stage may be called nervous. Putridity is added to the first sedative cause, and co-operates in the destruction of the whole machine.

Many observations have led me to think, that this pestilential virus may remain a longer or shorter time in the vital system when the plague is not completely developed and its crisis imperfect, especially when the buboes have not suppurated, or the suppuration from some cause has been suppressed; it is also probable, that the virus or cause of the plague acts in the same manner as some other species of virus, such as small-pox, measles, and scarlet fever.

The season most favourable to the action of this virus is that at which the plague prevails in Egypt, which is

during the *khamsyn*, a wind from the south that continues about fifty days before and after the vernal equinox; whilst, at other seasons, persons affected by it appear to enjoy good health.

I have seen many soldiers, who before had the plague of greater or less violence, experience relapses in succeeding years, at the same season, which were distinguishable from the plague itself by symptoms not only more light, but also different. The plague, properly so called, may also attack frequently, of which we had many examples; this proves the futility of inoculation. In relapses, the cicatrices of buboes ulcerate, and assume, in some cases, a gangrenous character; this local alteration is accompanied by loss of appetite, nausea, and vomiting of bile of a dark green colour, gravedo, vertigo, and general lassitude: in others, the buboes which had not suppurated, puffed up at the same time, and formed indolent blueish tumours, which either remained in a scirrhous state, or suppurated. In the latter case, the fluctuation was preceded by a gangrenous phlyctena, which indicated the necessity of promptly opening the abscess. These local symptoms were also accompanied by lassitude, heaviness of head, &c. I have seen some cases in which the cicatrices of carbuncles assumed a blackish tint, caused painful twitchings in the subjacent parts, and impeded loco-motion.

Gentle vomits, and the use of stomachicks, for some days are generally sufficient to cure these affections; but they return at the proper period with the same phenomena. I have remarked that relapses are not attended with contagion, no doubt, because the disease degenerates and loses its true character, in proportion to the distance of its recurrence, and the change of climate.—Most of the soldiers who were attacked with it in this

form, slept with their companions, in the barracks, without communicating the disease.

Among the great number of persons who relapsed in this manner, was M. Leclerc, surgeon of the second class, who had contracted the plague in Syria. Since this campaign, he had experienced every year slight returns, during the season in which the disease prevails; the buboes which terminated in this case by resolution, swelled to a great size, more especially one on the left side, that impaired the motions of the thigh, and kept the whole limb in a state of emaciation, and debility. The first year, while at Gizeh, near Cairo, a leprous eruption appeared on his face, of a very malignant character, and resisted all the means I adopted for its cure, it afterwards disappeared spontaneously when the season of the plague had expired. This gentleman being afterwards at Paris, at the same season was troubled with buboes, without any other symptoms.

I advised the application of caustick potass; he refused to submit to it, and, contrary to my advice, departed for St. Domingo. I was convinced, that this pestilential affection would predispose him to yellow fever, that is endemick in this climate, and with which the plague appears to me to bear a strong analogy; in fact he had scarcely arrived there, when he fell a victim to this destructive fever.

I shall omit many remarkable cases which support my opinion.

During the campaign in Syria, I examined the intestines of the dead, for the causes and effects of the plague. The first body that I opened was that of a volunteer, about twenty-five years old, who had died a few hours after his entrance into the hospital of the wounded at Jaffa; the principal symptom in this case was a carbuncle on the left arm.

His body was spotted with petechiæ; it emitted a nauseous odour, which, with great difficulty, I could support. The abdomen was inflated; the epiploon yellowish, and covered with gangrenous spots; the intestines bloated, and of a brownish colour; the stomach flaccid and gangrenous in many points near the pylorus; the liver larger than natural; the gall-bladder full of black and fœtid bile; the lungs of a dull white, intersected by blackish lines; the heart of a pale red; its substance appeared macerated, and tore with facility; the auricles and ventricles were full of black and liquid blood, and the bronchiæ loaded with a reddish froth.*

The second body inspected, was a serjeant-major's, of whom I have before spoken. I found nearly the same disorders in the viscera, abdomen, and thorax. The liver was more swollen; the gall-bladder excessively distended; the pericardium full of a sanguineous fluid, and the cellular tissue abounding with varicose vessels filled with black liquid blood. In Egypt I examined many other bodies of persons who had died of the plague, and observed the same appearances. Circumstances never permitted me to open the cranium.

This disease made great ravages among the inhabitants of Gaza, Jaffa, and St. Jean d'Acre. The Arabs of the desert, bordering on the sea, did not escape it; although it is scarcely felt in the mountainous villages of Naplouse and Canaan; but it prevails in the low marshy places and on the borders of the sea.

Of all the inhabitants who were seized with the plague in these places, but few survived: the mode of treatment pursued by their physicians, and their unhappy

* M. Betheil, surgeon of the 2d class, an intelligent active young man, who died of the plague at Jaffa, contracted it no doubt while assisting me in opening the body of this volunteer.

prejudices, which forbid a belief of its contagious nature, no doubt contributed to their destruction. I have not been able to obtain any certain accounts of the number that died of this disease, among the inhabitants of these countries.

I consider the plague as endemick, not only on the coast of Syria, but even in the towns of Alexandria, Damietta, Rosetta, and in the other parts of Lower Egypt.

Indeed, it appears to me to depend on causes peculiar to each of these countries:* what I have advanced will be evident on taking into consideration the structure of their cities, the streets of which are narrow, crooked, and unpaved, the houses badly constructed, and most of them filled with rubbish; besides this, each crossway forms a cloaca, in which the rain-water is received during the winter, more particularly in the maritime towns, and in Damietta, on account of the elevation of the soil of these places being beneath the level of the sea, the surrounding lakes, or the swampy and noxious rice-fields; when it is observed, that, during the same season, the south winds prevail in these countries, and continue until the end of May, rendering the atmosphere warm and moist; when we reflect on the want of cleanliness among the inhabitants, their bad diet, and inactive life, and add to all these causes the putrefaction of multitudes of dead dogs and other animals left in the crossways; the position of badly constructed cemeteries in the vicinities of these cities, in which the Turks leave an opening on the east, to communicate with the corpse, thus giving vent to the gas which is formed, and increasing the impurity of the air.†

* All the physicians of the army of the east, who have written on this disease agree with me in this point.

† The communication with Constantinople and the Levant was almost always interrupted in Egypt, during our stay in that country.

At Alexandria also, where the plague prevailed the first year with great mortality, many men and inferiour animals were killed, their carcasses were left lying on the ground, or were half buried beneath the ramparts, and contributed to the production of this disease.

At El Arych we lost seventy men by the plague, of a garrison of three hundred; many animals which had been killed during the siege, and were already putrefying, were buried near the fort with too little precaution.—At Gaza, the mamelukes, in many parts of the town, left a great number of horses which died of an epidemick that preceded the plague, which according to the accounts given of it by the inhabitants, made dreadful ravages among themselves, as well as among the mamelukes.

To say that Jaffa was taken by assault, will be sufficient to give the reader an idea of the accumulation of the above-mentioned causes of disease. A destructive pestilential fever was the consequence, which destroyed our troops and the inhabitants. The latter assured us that they had not witnessed such mortality from this disease, during thirty years, although it prevailed there annually.

I have remarked that the plague rages with more violence during the prevalence of the south winds, than when they blow from the north or north-west, in which case it diminishes, and even disappears if the cold winds continue for a long time.

When the disease commences with fever and delirium, the patient rarely recovers. Notwithstanding all the remedies which can be used, he dies in the first twenty-four hours, or, at the latest, on the third day: however, I had under my care an officer of the 32d demi-brigade, who had seven carbuncles, and notwithstanding the disease commenced with violent delirium, I had the pleasure of seeing them suppurate, and the eschars separate,

and the patient recovered after a very long state of convalescence. The wife of this soldier, in the sixth month of pregnancy, was also seized with the plague, but not in so violent a degree, and she was cured without any injury to the fœtus: but two other women in the same situation, whom I attended, miscarried in the first twenty-four hours, and died immediately after.

If the fever does not come on until the second day after the commencement of the disease, there is less danger, and the physician has time to guard against its attendant evils. I remarked, as I have before mentioned, that the plague rarely attacks those whose wounds are in full suppuration, but when they cicatrize, the patients in many instances, have been seized with it, and rarely escape death. We made the same remark on the inhabitants of those countries who had issues.*

I have also remarked, that mental disorders aggravate this disease, and facilitate its development in persons who have imbibed its causes; but however violent these disorders may be, their effects are not to be compared with the danger which results from a communication with the sick, or the contact with pestilential or contaminated bodies. We may be convinced of this truth by the ravages made by the plague, in the year 1801, among the fatalists or mussulmans.

Let no one suppose, however, that the name of *the plague* conveyed terrour to the troops. For they were too much accustomed to receive all sorts of impressions without emotion, so blunted were their moral and physical sensibilities by the shocks they had received in the painful campaigns we had already made. At the com-

* Galen, Fabricius Hildanus, Plater, Ingrassias, Pare, and other celebrated authors assure us, that in the countries which they have seen ravaged by the plague, this disease attacked none of those who had complete issues.

mencement of the disease, had it been represented to the soldiers, in the most favourable light, and the number of victims concealed, in order that they might admit the opinion then in general circulation, that the disorder was not contagious, they had not hesitated, in case of necessity, to use the effects of their dead companions. The contagion would thus have acted on these individuals, and they must have suffered the same fate. But it was not until they had a perfect knowledge of the character of this disease, that they used the precautions pointed out for their preservation.

To the ignorance of this fact, as professour Pinel has very judiciously observed, may be attributed the ravages made by the plague at Marseilles, in 1720. He says, in his Philosophical Nosography, (the last edition),

"The physicians Chicoineau, Verny, and Didier, are carried away by the celebrity of Chirac, principal physician to the regent; they dare not contradict him, they go even further, and repeat with him, that the pretended malignant fever is not contagious, or rather, that is in no other way contagious than in the terrour it inspires; but their opinions wavered a little when they saw the streets crowded with the dead and dying, &c." I shall subjoin the concluding words: "And since the long-delayed truth has come to light, we may observe, that there is no precise account of the plague of Marseilles, except the modest one given by an ignorant physician, who witnessed it in silence, and who appears to have no other ambition than that of being useful to himself."

The estimable author, Bertrand, in his medical account, coincides with the principles of his colleague, the surgeon of the galley-slaves at Marseilles, and shows how dangerous it is to conceal so important a fact.

When the plague first commenced, the mortality was very great; of ten attacked by it, eight died; but after-

wards more than two-thirds were cured. This success was owing, principally, to the courage and zeal of the chief physician, Desgenettes, who superintended in person, the treatment of those who were attacked by it.

The indications of cure vary according to the stage of the disease. At its commencement, that is to say, before the symptoms appear which may be called inflammatory, great advantage may accrue from evacuating the prima via, by means of vomits, as occasion may require. Antimoniated tartrite of potash has the double property of giving to the whole system a salutary concussion, removing the spasms of the capillary vessels, and opening the pores which should be assisted by diaphoretick and slightly antispasmodick drinks.

These means are sometimes sufficient to arrest the disease; but at all times they assist the exanthemata.

When the inflammatory period commences, the antimoniated tartrite of potash should be continued in small doses, infused in nitrated tamarind water, or vegetable lemonade. If there be any sign of local turgescence, cupping-glasses should be applied, but general bleeding is by no means advisable, how violent soever may be the apparent symptoms of general plethora. Antispasmodick theriacal drinks, stimulating pediluvia, lotions of the whole surface of the body, with equal parts of fresh water and vinegar, or citron-juice, which may be obtained in great abundance in warm countries, and finally, bolusses of camphor and nitrate of potash, to be taken at night, besides the etherial draughts. At this period a vomit would be dangerous, but it may be administered when the inflammatory symptoms subside, if necessary; it is very difficult to decide on the proper moment for the exhibition of this remedy, if it has not been administered at the commencement of the disease.

At the end of this second period, which is generally from the fifth to the seventh day, the eruptions take place; such as buboes or carbuncles. The eruptions should be assisted by maturatives or rubifacients. On the first appearance of the crisis announced by the cessation of pain, heat and rigidity, the re-establishment of cutaneous and urinary excretions, &c. to the acidulated diaphoretick drinks, we should substitute bitter tonick infusions, such as those of camomile, arnica, angelica, sage, &c, or weak coffee, to which may be added citrick or lemon acid and sugar. This beverage, which is also very agreeable to the taste, we used with great advantage.

In this third stage which is truly nervous or adynamick, producing prostration of the vital powers, it is necessary to increase the dose of tonicks. Quinquina should be added to the bitters before enumerated; we should mix decoctions of coffee with vegetable or mineral acids and bitter liquids; the doses of camphor should be augmented, and bathings of the surface of the body should be made with pure camphorated vinegar, or with brandy and camphor. We used brandy extracted from dates, for this purpose.

Oily frictions, advised by some writers, were used by M. Villepreux, surgeon of the first class, in the hospital at Belbeys, without any advantage. They may, however, be used as preservatives.

When the buboes pass through all the stages of inflammation, and begin to suppurate, it is necessary to assist nature to produce this termination, which is the most favourable. Warm cataplasms of squills roasted on the coals, should be applied; they accelerate inflammation and facilitate the formation of pus: I used them with advantage in Syria, where these bulbous roots abound. It is not necessary to wait the perfect maturation of the abscess, in order to open it, which should be done with a

cutting instrument. If the bubo be indolent, without change of colour in the skin, and the debility of the patient be great, a small actual cautery should be applied, and immediately afterwards a cataplasm. This often provokes inflammation, which is followed by suppuration and the cure of the patient. The potential cautery is too slow in its effects, and does not yield the same advantages; the dressings should be simple, but tonick and suppurative.

The treatment of carbuncles consists in exciting slight inflammation in the subjacent parts, which causes the eschars to be detached: warm and rubifacient cataplasms are serviceable in this case, also fluid caausticks if preceded by scarifications and excision of the gangrened parts.

It cannot be doubted that the plague is endemick and contagious:* its rapid progress, and the series of very

* The Egyptians have remarked, and many celebrated physicians confirm it, that two epidemicks rarely exist together. Indeed, we observed, that in the year 1799, when the plague raged in the maritime towns of Egypt, and Syria, and even in Cairo, we heard nothing of the small-pox, and I do not recollect to have seen a single infant affected with it. In 1800, on the contrary, we had few examples of the plague, and the small-pox ravaged the country, especially at Cairo. In an interregnum of this last disease, the yellow fever appeared.

In 1801, the plague devastated Upper Egypt, and destroyed a great many inhabitants of the capitol, but the small-pox did not appear.

During the siege of Alexandria, we were afflicted with an epidemick scurvy which extended generally to all the inhabitants of the town and all the soldiers of the army, and we had but a few cases of the plague. The first case was of a member of the commission of arts, (M. Lerouge,) who had just arrived from Cairo, where he had probably contracted the disease. This intelligent man died at the lazaretto on the third day from the attack of the plague: the principal symptoms were a bubo and two carbuncles.

The second case was that of M. Force, an officer of the 18th demi-brigade. At that time he lived in a private house

unhappy proofs which occurred among the Mussulmans, leave no doubt of its contagious character;* but it does not appear to take place at every stage of the disease, and it is also propagated in various modes. I do not believe, for example, that the plague is communicated when it is slight, and in the first stage. Neither do I think that there is any danger of taking it by touching the pulse of the patient with the tips of the fingers, by opening the buboes or carbuncles, by speedily applying different topical applications, or touching a small part of the surface of the body, or the garments, or from passing through his apartment, provided, there be a constant current of air. Convalescents in this disease, or those who have simple relapses do not communicate it.

Danger is to be apprehended from remaining a long time in the rooms of the sick if badly ventilated, or an atmosphere in the region of exhalations from dead bodies, or near persons in the third or fourth stage of the disease, that is to say, during the exanthematous and nervous stages. We

in Alexandria, where I attended him during the first twenty-four hours; I then ordered him to be transported to the lazaretto, where I continued to attend him. The disease passed mildly through all its stages: I opened an enormous bubo on the right groin, which was formed on the third day, and terminated favourably.

The third case was M. Rouveyrol, surgeon of the second class, on duty in the lazaretto. The disease made the same progress and terminated as in the case of M. Force.

The wife of a serjeant major of the cannoniers, named Peres, was also attacked by this disease. I separated her from her companions in the barracks, and cured her, notwithstanding the violence of the symptoms.

Seven soldiers were attacked by the plague; two of them died, and the other five were cured, previous to our departure for France. General Menou was the thirteenth example of the plague at this time, a number, scarcely to be mentioned in comparison with the number of cases of scurvey.

* The epidemick which prevailed in Cairo and Upper Egypt, in 1801, swept off 150,000 Egyptians, and but a small number of the French.

should avoid touching large surfaces of the body, and prohibit the use of the clothes of persons who have been infected with the plague.

I am of opinion that the matter contained in carbuncles and buboes will communicate the disease when applied to the sensible and internal parts of the body, if taken from carbuncles that are advancing towards their acme: thus M. Charroy, an officer of the guides, was affected violently with the plague, in the year 1801, with a bubo on the right groin, which through neglect was not opened, before the bubo burst by a sort of metastasis, an inflammatory sinus formed along the internal parts of the thigh, in the course of the crural nerves, as far as the the knee, where a carbuncle appeared. From these branched out two other fistulæ, which terminated one at the internal malleolus, the other on the tendo Achillis, where they produced other carbuncles of the same nature. The method of treatment pointed out in a preceding page was used with success. The patient was completely cured in three months.

But it was remarkable that during the paroxysms of the disease, which continued about six weeks, the whole right side of the body was paralyzed. The patient was deprived during this time, of the sight of the right eye, of the use of the right ear, and nostril, and lost part of the sense of taste and the motion of the arm, fore-arm, breech, thigh and leg of the same side, which were almost in a state of atrophy; all these symptoms, however, ceased with the disease, at the end of the season in which it prevailed. The patient soon recovered the use of all his faculties, and returned to France, where he enjoyed, apparently, good health, until the return of the season corresponding to that of the plague *(khamsyn)* in Egypt. I sent him to the mineral waters of Barege, for the purpose of re-establishing the muscular strength of the

limbs. These means did not prevent the frequent returns of the disease at the period above mentioned, as he informed me by the following letter, dated

Paris, June 28th, 1806.

SIR—"I have the honour of informing you, that, notwithstanding the use of the mineral waters, which I have taken for two successive years, as well at Bourbonne as Barege, I have experienced every year, since my return from Egypt, during the months of March, April, and May, (the season at which I was affected with the plague) symptoms which appear to me extraordinary.

I experience pain in the thigh and leg which have been before attacked; I then feel pricking pains, and more frequently painful contractions, and these limbs are often in a paralytick state; every evening, during the three months above-mentioned, the extremity of the weak leg swells to such a degree as to give me much uneasiness; I experience at the same time great apathy; I am overcome with drowsiness, at every moment of the day, and, notwithstanding the exercise to which under such circumstances I am obliged to have recourse, I often sink down with drowsiness, even while walking, &c."

All these symptoms evidently prove that the pestilential virus acts principally on the cerebral system, and the nerves of animal life.

Before our departure from Alexandria for France, general Menou was attacked with all the symptoms of plague, which appeared in a slow and gradual manner. He complained of heaviness in the head, difficulty of respiration, lassitude, general debility, with swelling of the inferiour extremities, especially on the left side, and

shooting pains in the groin of the same side; he was agitated at night by insomnia, and when he dozed, he was troubled with frightful dreams; his pulse was small and frequent.

The general had been in this situation for three days, when he sent for me on the 14th of October 1801; he had already taken some bitters. He sent for me again on the 15th at 5 o'clock in the morning, in order to show me three carbuncles, which had been formed during the night on the internal superior part of the left leg. He was not alarmed by their symptoms; for he had been affected in a similar manner at Rosetta, in 1799, when about to take the command of the army in Palestine. Nevertheless, he was restless, and in a morose depressed state. Debility, a fixed look, pains increasing, irregularity of pulse, and considerable heat about the præcordia, made me dread its termination. The south winds, or *(khamsyn)* began to prevail, and all the army had either departed or were ready to sail. We had consequently no alternative, but to remain in a town which emitted contagion from a thousand different sources, in the midst of enemies, and, perhaps, without any means of relief, or to carry the contagious disease on ship-board. I thought this last the most advisable, and least disadvantageous; and in the frigate I chose a separate apartment for the general. I was obliged to insulate myself from them, in order to assist my patient without communicating the disease, in case it should arrive at such a stage as to be contagious. I had also every reason to think, that a removal from the soil of Egypt, a change of air, and the motion of the sea would produce a favourable termination of the disease: besides, we should arrive in France at a season unfavourable to the development of the plague, especially if the air be cold and dry, as it then was; I designed to stop at one of the isles of Greece, if

the disease assumed an alarming character. I pressed the general to depart, telling him the dangers that attended the least delay: he followed my advice, and embarked on the evening of the 17th of October. The vessel got under weigh on the 18th at day-break. The carbuncles enlarged during the night, and all the other symptoms were aggravated.

The first carbuncles which were formed, were surrounded with reddish erysipelatous lines, which branched out in different directions in such a manner as to overrun the whole internal and external surface of the leg, as far as the ankles. These morbid fistulæ produced here and there other small carbuncles of a character similar to the first. I have remarked, that the carbuncles are generally situated in those parts of the body in which the cellular texture is more firm, while buboes rise where it is relaxed, for instance, on the groin, armpits, &c. It may be remembered that M. Charroy's case corresponded exactly to these remarks.

To general Menou I was about to administer antimoniated tartrite of potash and the other medicines usual on such occasions, when suddenly the south winds which had blown us from the coast of Africa, changed to the N. N. west, and became very violent. The general was immediately siezed with sea-sickness; he vomited copiously of bilious matter, and had large alvine evacuations and abundant perspiration. These violent shocks made me fear for his life; however, the patient became easy soon after the cessation of the storm; the pains of the head went off, he slept well, and was soon in a condition to receive stomachicks. The gangrenous eschars of the carbuncles surrounded by a reddish circle, was the symptom of approaching suppuration and a return of the vital powers.

I applied to the carbuncles, as I had previously done, styrax ointment mixed with camphor and the red bark, and to the whole surface of the leg, compresses wet with red camphorated and ammoniated wine. I prescribed, internally, bitters, camphor, opium, Hoffman's anodyne liquor, and quinquina, in convenient doses, according to circumstances. In a few days the carbuncles suppurated, and the eschars were detached. I then dressed them with wine and honey; this treatment I continued until the period of cicatrization, which was nearly complete on our arrival in France.

The general regained his strength gradually, and the patient was cured when we entered the quarantine ground at Toulon. There I caused his effects, in common with those of every other individual on board, to be aired and fumigated. The first cold weather which he experienced at Marseilles, brought on an obstinate dysentery, which confined him to this town for the remainder of the winter. But the return of fine weather, and the care of his physicians, enabled him to return to Paris, next spring, in a good state of health.

From these facts we may fairly make the following deduction; that inoculation for the plague is useless and even dangerous. Dr. James M'Gregor, superintendant of the English army in Egypt, reports in his account of the expedition among the Cypayes (Indians*) that Dr. Whyte, physician of that army, inoculated himself in his presence, with the pus of a pestilential bubo, and during their stay at Rosetta, died of the plague on the ninth day. A carbunculous tumour was formed on the part of the groin at which the operation was performed.

The dangers which Dr. Wallis incurred, at Constantinople, by being superficially inoculated for the plague.

* Vide British Collection, No. 135.

after having used vaccine virus with temporary success, are well known. This eruption, no doubt, acts as any other emunctory, when it has been long established; for, at the commencement of the disease against which it is used as a preventive, this emunctory does not obviate its attack.

Great precautions are necessary in order to guard against the plague: the most efficacious of these are, regular exercise, cleanliness, and good regimen; it is advantageous to excite emunctories or eruptions of every description, as the best preservative: and it would even be advisable for those who cannot withdraw from the focus of contagion, to establish on themselves a permanent issue or vesicatory on some part of the body.* We ought to avoid the immoderate use of spirituous liquors, of flesh, and milk; and drink a great quantity of coffee with an infusion of sage, in the morning upon an empty stomach; to wash the body frequently with vinegar and water; not to bathe during the sickly season; to sleep in dry airy places; frequently to change our linen and clothes; to avoid sexual intercourse; and on the slightest symptoms of saburra, to take a gentle vomit, with copious draughts of porridge. For this purpose it is prudent to carry a few grains of an emetick in climates in which the plague is endemick.

The causes which produce it in Egypt might be diminished and insensibly removed by preventing the stag-

* The royal medical society of Paris, in 1783, according to the excellent memoir of Dr. Carrere, considers the use of artificial drains as the best preservative against the plague. Indeed, all the celebrated physicians, from the most remote antiquity up to our day, are of this opinion, and most of them, from experience, agree in its efficacy.

As advocates of this mode of prevention, I may name Hippocrates, Galen, Zacutus Lusitanus, Fabricius Hildanus, Lancisi, Thos. Willis, Muller, Sennertius, Mercurialis, Richard Mead, Lieutaud, Kœmpfer, Prosper Alpinus, &c.

nation of the waters of the Nile, at the time of their subsidence, in the reservoirs placed near the houses; by cutting canals in a proper manner to irrigate the land; by making plantations in all the moist and swampy places; removing the rice-fields further from the dwelling houses; by removing all the cemeteries to the deserts, or the west side of the cities; by razing the tombs which are, of necessity, left in these cities, and covering them with at least one layer of quicklime; by raising the foundations of the houses so high, as to put them beyond the reach of the greatest inundations; by covering the streets with gravel; by constructing aqueducts, with a gentle declivity, in the maritime towns, in which the rains are most frequent; by changing the construction of the houses of the indigent classes, and by making the people sensible of the possibility of preserving themselves from the contagion, and of curing it, after the manner of the Europeans, who are able, by means of the precautions which they take to preserve themselves from disease, or to remove it by proper medicines; finally, one of the greatest safeguards against the invasion and propagation of the plague, is to explain to the Egyptians, and to inculcate the practice of the wise plans which the commission extraordinary of publick safety have devised and put into execution with such unexpected success.—This commission, created by general Bonaparte, was composed of the general commanding at Cairo, of the general of the engineers, of the admiral and inspectors, of the chief surgeon and physician of the army; each member presided in rotation. Three other particular commissions, subordinate to the commission extraordinary, were established at Alexandria, Rosetta, and Damietta. They were organized on the same plan.

I shall here mention the measures taken by these commissioners to prevent the invasion of the plague, or to stop its progress.

Being in the centre of the army, near to the general etat-major, they had an opportunity of directing and adopting such measures as were calculated to preserve the health of the Egyptians and of the army. It maintained a constant correspondence with the inferiour commissions, and superintended all their operations.

A corps of observation, under the orders of the commission extraordinary, was stationed on the point of the Delta, to examine the vessels ascending the eastern and western branches of the Nile. Thence these vessels were conducted, under the direction of the health officers to the grand lazaretto, established at the isle of Roudah, there to be subjected to quarantine or inspection. The inspectors or health officers, who were under the orders of the commission extraordinary, had the infected persons or vessels separated from each other.

The infected persons were placed in a row of bamboo cabins, divided by fences, in such a manner, that no communication could be kept up except by sight and speech.

Persons who were sick of the plague, were placed in the hospital of the lazaretto, which was divided into small wards. A French physician and an Egyptian surgeon's mate were specially charged with the care of these patients, who were attended separately throughout every stage of the disease. The president of the commission extraordinary was active and vigilant in his attention over these establishments; he represented the commission, and gave orders in his own name, for which he was accountable to his colleagues. A report from the hospital and lazaretto were every day transmitted to the commission, with a bulletin of the sick, and the progress of the disease.

The Egyptian commissaries in the principal quarters of the town, were obliged every day to visit the houses allotted to their charge, to preserve their cleanliness, to learn exactly the number of deaths and the cause, and to render an account to the commission of every thing relating to the publick health.

Whenever a case of the plague occurred, the patient, if a Frenchman, was sent to the lazaretto, if an Egyptian, he was secluded from society, and attended by French physicians. All travellers were sent to the lazaretto. All infected articles were purified or burnt. The superintendence of this commission extended to the camp, the barracks, and throughout Egypt generally.

The surgeons of regiments, under the orders of the chief surgeon, himself a member of the commission, were every day obliged to visit the quarters of the soldiers, and to give a minute account to the commission of every event that might occur. The principal health officers of the hospitals for the army were subjected to the same laws.*

The army broke up their encampment on the night of the 21st of May, and took the road to Egypt. This measure was imperious, inasmuch as we were menaced, in this country, with the arrival of innumerable troops from the various countries of the east. This journey was as distressing as the former. The troops, weakened by disease, fatigue, and privations, were obliged alternately to lead and carry their disabled fellow-soldiers. The heat was already very great, and increased as we approached Egypt. We kept along the sea-coast and passed by Ce-

* The minutiæ of this arrangement were not put in execution until some time after our return from Syria; but I have inserted them at the conclusion of the memoir on the plague, as connected with the history of that disease.

sarea, a name which recals to mind this celebrated city built by Cæsar. The Cesarea of the present day, is a strong place of a square form, in a good state of preservation; it was built by the Croises. We found at the foot of its walls, and at a short distance from the sea, a spring of excellent fresh water. Behind Cesarea are the very interesting ruins of the ancient city.

Our passage to Jaffa was less agreeable; the town was deserted by the majority of its inhabitants. All the sick and wounded who had travelled along the coast, were stowed in its hospitals; the port, and the neighbouring streets presented a distressing spectacle. We spent three days and nights in dressing the wounded; I then shipped to Damietta, all those whose diseases or wounds were most acute, and sent the remainder into Egypt, through the desert. It is almost impossible to form an idea of the fatigues which the army-surgeons underwent at this time.

After this, we resumed our route, and entered the desert without stopping at Gaza. In passing by El Arych, we left there those who were affected with the plague, and had followed us, and those who had been taken sick on the road. During this journey we suffered much; but our troubles were increased, when we arrived at the sandy plain that extends from the bridge of the Romans to Salehyeh, for we were surprized by the pestilential winds, and experienced, for the first time, the terrible effects of the *khamsyn*, or hot winds from the southern desert. I shall borrow Volney's description of it, because it is correct.

"We may compare," says Volney," "the impression produced by these winds on our organs, to the heat of a common oven, when the bread is taken out of it. The atmosphere, which is generally so serene in these climates, becomes agitated; the sun loses its brilliancy, and

presents only a violet coloured disk; the air is filled with an impalpable dust, which is in constant agitation, and penetrates every thing. This wind, always light and rapid, is not at first very hot; but in proportion to its continuance, is its heat increased. All animated beings are immediately sensible of the change. The lungs, irritated by the presence of this air, are contracted or rendered crisp; respiration becomes short and laborious; the skin is dry, and the traveller is overpowered by internal heat: he is desirous of drinking copiously; perspiration cannot be re-established; he seeks in vain for something cool. The substances which were wont to produce this effect, mock the extended hand; marble, metals, and water, although the sun be obscured, are warm: at this time the inhabitants of the towns and villages shut themselves up in their houses, and those of the deserts in their tents, or in caverns and wells dug in the earth, where they wait the termination of this tempest. It generally continues two or three days; when it exceeds this period, it is insupportable. Miserable are the travellers whom this wind surprizes on their journey! Far from an asylum, they must encounter all its violence, which sometimes ends in death. The danger is most imminent during the squalls; the heat of the wind increases with its violence to so great a degree, as to occasion sudden death from actual suffocation: the circulation is interrupted, and the blood is driven, by the last contractions of the heart, to the thorax and head; hence the hemorrhage from the mouth and nose at death, or immediately afterwards.—Those of a full habit are more particularly liable to be acted on by this wind; if the system be exhausted by fatigue, they soon sink under it. The dead bodies swell prodigiously, and putrefy rapidly.

"Its effects may be in some measure moderated by covering the face in any manner, or, as the camels do, by

puting the nose and mouth into the sand until the tempest has blown over, which is usually in two or three hours. This wind crisps the skin, evaporates animal moisture, closes the pores, and produces the febrile heat which always accompanies suppression of perspiration."

I felt these effects to so great a degree, that I had nearly sunk under them; a few minutes afterwards I fainted from the agony, and resigned all hopes of reaching Salehyeh. Many of our quadrupeds were suffocated, more especially the horses; in short the whole army suffered considerably. This journey was fatal to some who were convalescent from the plague.

The sight of the fertile plains of Salehyeh, shaded by immense forests of palm-trees, and the waters of the Nile, together with the palatable food which we met with, and the pure air that we inhaled, gave us new strength. Our passage over the province of Charquyeh, then covered with luxuriant harvest fields, was truly delightful.

We left our sick and wounded at the hospitals of El Arych, Quatyeh, Salehyeh and Balbeys, where they remained until perfectly cured; a considerable number embarked on lake Menzaleh, for Damietta, to rejoin the wounded who had been sent there directly from Syria. From this last town we removed them all to Cairo, where we completed their cure.

Previous to our arrival at Salehyeh, we found some ponds of fresh muddy water, such as we afterwards met with in the deserts bordering on Lybia; they were full of small insects, among which was a species of leech,* resembling that found in the isle of Ceylon; it was several millimetres in length. Although generally no thicker

* See Knorr's Voyages. It also appears to have some resemblance in form to the *hirudo alpina nigricans* of M. Dana. (Vide Valmont de Bomare.)

than a horse-hair, it is capable of acquiring the usual size of a leech, when it is filled with blood. It is of a black colour, and has nothing remarkable in its shape.

Our soldiers being parched with thirst, threw themselves down on the edges of these pools, and, without suspecting that an enemy lay in wait for them, drank with great avidity; many of them immediately perceived the biting of the leeches which they had swallowed, in the posteriour fauces; a frequent cough ensued, with mucous expectoration, slightly tinged with blood, and a disposition to vomit. To this irritation produced by the leech in the sensible parts of the throat, a swelling of those parts and frequent hemorrhage soon succeeded.—Deglutition became difficult, and respiration laborious, and the concussions on the lungs and diaphragm, produced by the cough, caused acute pains through the whole thorax. The cough was increased by motions of the lower extremity of the leech, when it touched the epiglottis or the edges of the glottis. (The blood which is suffused over this part may also produce the same effects.) The men became emaciated, and lost their appetite and sleep; they were disquieted and agitated, and if the necessary relief had not been administered, these symptoms would have terminated in the death of the patients, as was the case more than once.

Zacutus Lusitanus* mentions a person who died in about two days from the bite of a leech, which had been introduced, by accident, into the nares.†

The Egyptians know when the horses have taken them in their nostrils while drinking from these pools; they discover it by the restlessness of the animal, and by

* *De Medicinæ principiis*, Lib. I. p. 5.

† There are many instances of persons who have died from the effects of leeches introduced into the urethra, the vagina, or into the rectum.

the hemorrhage from the nose, on the same, or the following day.

The farriers of the country extract them with great dexterity, by means of pincers made for this purpose; and when the leech is beyond their reach, they inject salt water into the nares of the horse; but we had no example of this accident happening to a man. The first individual who suffered from this leech, was a soldier of the 69th demi-brigade, who arrived at Salehyeh on his return from Syria, with a pricking pain in the throat, with cough and expectoration of blood. The quantity that he lost in this way, enfeebled him considerably; I sent him to the hospital of this place; I interrogated him, and endeavoured, in every way, to discover the cause of these symptoms. By depressing the tongue with a spoon, I discovered the tail of the leech at the isthmus faucium; it was about the size of my little finger. I immediately introduced a pair of forceps for the purpose of seizing it; but on the first touch it retracted itself behind the velum palati. It became necessary to wait a favourable opportunity to discover it, and when this occurred, with a pair of curved polypus forceps, I extracted the reptile at the first attempt. This was attended by a slight hemorrhage, which soon ceased, and in a few days the patient recovered.

During the passage of the army from Syria to Balbeys, twenty soldiers affected in the same manner, entered the hospital. In almost all these cases, the leeches were situated near the posteriour nares, behind the velum palati; but in some instances they had penetrated into the œsophagus, and thence descended into the stomach: here they remained for a longer or shorter time, and were very inconvenient to the soldiers, until detached

by vinegar mixed with a little water and nitre, or by the action of this viscus alone.*

Gargarisms of vinegar and salt water are sufficient to detach those which are placed in the posteriour fauces.—Polypus forceps should be used, fumigations of tobacco, and squills, with occasional injections of salt water. Two of these patients who did not enter the hospital until two days after they had swallowed the leeches, were in a state of great debility and danger.

M. Latour Maubourg, chief of brigade, commanding the 22d regiment of cavalry chasseurs, left Alexandria at the time of the blockade, to join his regiment at Cairo. He passed through the desert Saint Macaire, which borders on Lybia. His means of transportation being insufficient for the conveyance of the requisite portion of fresh water, he took up some muddy water that he found in small pools about a day's journey from the Pyramids.—The soldiers of his escort, having preserved fresh water in their leathern bottles, did not drink of the pools, and thus escaped the accident which occurred to M. Latour. Two leeches which he swallowed, tormented him during the remainder of the march, and reduced him to the last degree of emaciation and debility. The cough and spitting of blood continued for some days, even after his arrival at Cairo, for the cause was not then understood. The medicines which were used, aggravated the symptoms, and endangered the patient; when one of the leeches discovered its tail filled with blood, at the entrance

* When the French took possession of Port Mahon, one of the Balearic Isles, in 1757, many of the soldiers suffered from the same cause, which was then unknown to the physicians of the army. One of these sufferers, after vomiting about three pounds of blood, at different periods, asked for the remedy most suitable to his situation, vinegar, and by this the leeches were expelled. Vide *Hist. of Surgery*, by Perhille, vol. II.

of the posteriour fauces. The patient himself pointed it out to his physician, who extracted it with a strong pair of dressing forceps; and the second, which was in the fossæ nasales, was destroyed by injecting salt water through these passages.

M. Latour's convalescence was tedious, on account of the great loss of blood, and the fatigues he had undergone in this journey.

Pierre Blanquet, one of the guides, during the siege of Alexandria, while in the deserts near this city, swallowed a small leech while drinking of these pools. It passed from the posteriour fauces into the nares, where it insensibly increased. He paid no attention to the slight symptoms that appeared during the first days; but he soon experienced hemorrhage from the nose, and disagreeable prickings in the nostrils, acute pains in the sinus frontalis, vertigo, and transient delirium; all his functions were disordered, and he became much emaciated. After languishing in this state about a month, he was sent to the hospital at Alexandria. The difficulty of breathing through his nose, and the frequent hemorrhages from it, led me to suspect the existence of some foreign substance in the nares; and on the first examination, I discovered the extremity of a leech, in the left nostril: at first I took it for a polypus; but, on touching it with a probe, it suddenly contracted. I desisted for the present, and waited for another opportunity; when, after having cautiously opened the entrance of the nostril, I seized the leech with a polypus forceps, and extracted it instantly.

The symptoms abated, the hemorrhage ceased, and the patient was soon in a condition to return to duty.

When troops or travellers are obliged to drink these waters while crossing the deserts, they should be careful to strain them through a piece of thick linen, and to add to them a few drops of some acid, if it can be procured;

consequently each individual ought to carry with him, besides a leathern bag, &c. a flask of nitrick or acetick alcohol.

At Matharieh, the army halted for two days: orders were given to the soldiers to wash their linen and clothes, and to burn all their effects that could not be purified; after these measures were taken, orders were issued that the troops should enter Cairo without being subjected to quarantine.

General Dugua left Cairo at the head of the troops that had been under his command in Egypt, to meet us. With what pleasure did we embrace our old companions in arms! Fatigued with the labours of a long campaign, our systems weakened by continual privations, and the scorching sun of the deserts, we met as brothers and friends, united by the same interests and love of glory, in a foreign land, which we now beheld as our adopted country.

The commander in chief entered the capitol through the gate Bab-el Nasser, at the head of his army: the inhabitants crowded the streets, shouting with joy. Our arrival was highly gratifying to them, as their country was menaced on all sides by innumerable enemies, and especially by the Turks, whom this peaceable and docile people had always dreaded. The presence of general Bonaparte was their shield, and from this time they felt perfectly secure.

During our short stay at Matharieh, I received letters from Alexandria. The surgeon major Masclet, in his letter of the 21st December, 1798, informed me, that the military and administrative authorities had adopted the salutary measures that had been proposed for arresting the progress of the contagious disease, to which too little attention had hitherto been paid; for at Alexandria, as in

Syria, they would not at first believe in the existence of the plague, so strongly persuaded were the professional men that the disease, of which many surgeons of the navy had died, was nothing but a malignant fever. "The want of precaution," says M. Masclet in his letter to me, "has given rise to the consequences that I dreaded; the countersign was not observed at the hospitals, as I had ordered in my letter, of which I enclose you a copy, and this neglect has introduced infection into the linen-magazine: the guard of the magazine and his assistants died of a disease, which I do not hesitate to call *the plague*.

"Happily the contagion has not yet reached the wounded of hospital No. 1; I have had them removed to-day, to undergo a quarantine of observation. Forty-five have died in hospital No. 2, of the 4th, 61st, and 88th demi-brigade."

M. Masclet informed me, in another part of the same letter, that the board of health, who had at first been unwilling to adopt any of the precautionary measures proposed by the two chief health-officers of the military division, had forbidden them to enter the hospitals, and they were not even consulted on the mode of quarantine established by this board; thus these surgeons were prevented from being useful to the sick.

In another letter, two days later, M. Masclet says, "The precautions we have taken to preserve the hospitals from the contagion, were dictated by the most urgent necessity; there was every day one or two new cases in the marine hospital, the vessels, and the camp. I ought, Sir, to observe to you, that our wounded have hitherto escaped the contagion; it has prevailed more particularly among the marines, the servants, nurses, and cooks of the hospitals and the city; I compute our daily loss at four or five men; but none have died who had chronick wounds.

that which is the consequence of a diet to which I have confined him, have contributed, I think, not a little to the absence of the ordinary symptoms. I have observed the same symptoms in the progress of the disease, in a number of others of a similar temperament."

In another letter still more recent, after mentioning many interesting circumstances relative to the surgical service in the hospitals of Alexandria, Masclet continues the subject of the plague, "which sometimes with the violence of the most acute malignant fever, carries off its victim on the second or third day from its commencement: sometimes it appears under a form apparently more mild, but not less fatal; and sometimes it presents symptoms of a character so trivial, that the patients are free from fever, delirium, vomiting, &c. &c. and suffer only from the formation, suppuration, and discharge of one or two buboes. In this situation is young Niel, of whom I have before spoken: a bubo which appeared on him was opened without occasioning any sort of pain. Another surgeon of the third class, M. Laforgue, affords an example of the violence and rapidity of the symptoms of this disease: he perceived the first effects of it on the 28th of January, 1798, in the morning; he became delirious on the same day, and on the night of the 29th, he killed himself by leaping from a window. An apothecary belonging to the navy underwent the same fate a few days before this. Death is generally the termination of this disease, when it attacks the porters, cooks, &c. of the hospitals. The fourth demi-brigade has suffered many losses of this kind: the 75th is not yet impaired.

"It seems that the appearance of the plague in this city may be referred to local causes; the free communication between the inhabitants and our troops, may also contribute to it: the former are generally seized with it

on entering the hospitals, and die in the shortest time. I have also remarked that they who are of a scorbutick diathesis, are most liable to it. Some naval surgeons, with this scorbutick habit, on entering the lazarettos to which they were called, were seized almost immediately with the plague, and died.

"M. Niel, on recovering from his bubo, desired my permission to attend to the duty of the lazaretto or hospital No. 3. Many other surgeons of the military and marine departments, employed in the lazarettos or hospitals infected with the plague, have requested me to permit them to attend to the same duties until the disease shall be entirely removed. Such examples of devotion and courage merit extraordinary marks of your approbation."*

Masclet, animated by a noble enthusiasm, and by an ardent love of his profession, set an example to his companions, by confining himself to the hospitals, where, without fearing the danger to which he was exposed, he paid the most zealous and correct attention to a number who had the plague, consoling some, confirming others, and saving a great number of those whom death would, no doubt, have cut off, unless he had interposed with the weapons of science and humanity. Of ten patients he cured five, six, and seven on an average. But M. Masclet, whose zeal and courage were above all praise, relying on his constitution and the prophylacticks which he employed, operated on and dressed all who were attacked with the plague, with the same confidence that he would have manifested in the treatment of an intermittent fever in France: he could not always triumph over this formi-

* For those who distinguished themselves in the hospitals at Alexandria and elsewhere, I procured promotions and peculiar indemnities.

dable and subtil disease; but was finally seized with it himself, after seeing all his young companions fall round him in succession, with his favourite pupil M. Neil, who was a second time attacked by it. In short we had the misfortune to lose in him, a most devoted friend to humanity, and a most zealous and intelligent colleague.

Worthy companion of my labour! accept, with thy pupils, the tribute of my esteem and regret, with the most sincere assurance, that thy memory and thy name are indelibly imprest upon my heart.

SECTION IV.

ON my arrival at Cairo, M. Casabianca, who had filled my place in Egypt, gave me an account of the results of his operations.

He informed me that M. Renoult, surgeon of the first class, who had been charged with the direction of the *ambulances* of Desaix's division in Upper Egypt, had sent him at different periods, the men who had been wounded in the numerous engagements which this division had had with the mamelukes of Mourad Bey, and the pilgrims of Mecca coming from the interiour of Africa. Among the wounded, some had undergone important operations; the results of which were fortunate. The larger number of them had in a short time returned to their division. This surgeon also informed me, that the treatment of ophthalmia, which has already been detailed, had there been adopted with the greatest success.

From my correspondence with the maritime cities of Egypt, I learned that the disease which prevailed at Alexandria, Rosetta, and Damietta at our departure from Syria, presented the same characters as that which we

had to encounter in the latter country, and that the number of its victims among the medical staff was also great.

I was also informed that some of our soldiers had been wounded in the different actions which had taken place with the Arabs while in pursuit of them. From Suez I received an account of M. Jourdon, surgeon of the second class, a young man of uncommon merit. He was killed by the explosion of a vessel destined for the expedition of Qosseys, (th e ancient Berenice.)

I had begun to organize my hospital staff, when I received orders from the commander in chief, to follow the head quarters to the Pyramids, near which was formed a camp of observation.

As I wish to confine myself to my subject, I shall not enlarge my observations relative to these vast monuments, which appear to have been founded in the most early periods of time. I traversed all the sinuosities of the subterraneous caverns of the grand Pyramid, and engraved my name, as many others had done, on the stone which forms its apex. On account of its immense elevation, its ascent is as painful as the visit to its labyrinth was difficult. I also visited the numerous catacombs which are found in its environs.

After sojourning a short time at this encampment, the commander in chief received information, that an army of 20,000 Turks had made a descent upon the peninsula of Aboukir. He immediately marched with his army towards Alexandria.

We again crossed the deserts of Lybia, but still kept near the confines of the cultivated country of the province of Bahhyreh, and on the third day we arrived, after a forced march, at Rahhmanieh, where the divisions from different parts of Egypt were re-united. Thence we marched to Alexandria: the army took a position at the entrance to the peninsula, and its head-quarters were

established in the city. In consequence of the orders and instructions which I had received from general Berthier, chief of the etat major, I caused two large hospitals to be established in Alexandria; I ordered a large quantity of dressings to be prepared; I invited M. Mauban, surgeon of the first class, who had the care of the hospitals at Alexandria, to be ready to receive the wounded that I should send him from Aboukir, and I requested the active marine surgeons to repair to our hospitals, and assist in dressing the wounded. These dispositions being made, I rejoined the army, which had advanced into the peninsula. During the night, we approached the camp of the enemy, and reconnoitred their position, with the redoubts and intrenchments which they had already made. At landing, they had possessed themselves of the fort and the grand redoubt, which protected them, and had there beheaded forty of our men.

July 25th 1799, at break of day, our army found itself but a short distance from that of the Turks. The signal of attack was given, and in spite of the vigorous resistance of the Mussulmans, our men leaped the intrenchments, climbed the redoubts, and carried them by assault. The first shock was terrible, and the victory for some moments uncertain; but the presence and activity of the general redoubled the courage of our soldiers, and after a new effort, the victory was ours; it was complete; the enemy were repulsed, and their whole army routed. Those who escaped our swords fled towards the fort of Aboukir, or to the river with the expectation of gaining their vessels which were in the road. The cavalry, well directed by general Murat and adjutant general Roise, charged them with such impetuosity, that few arrived at the river; the remainder were drowned. Some took refuge in the fort, raised the draw bridge, and there defended themselves six days; when, reduced in number

by our cannon, and by hunger and thirst, they surrendered at discretion on the seventh day. In going out of the citadel, these unhappy prisoners threw themselves into the cisterns which were near the road. Many died, being first exhausted by thirst, and afterwards overcome by the quantity of the water which they drank.

This memorable battle destroyed the army of the enemy. More than 10,000 men were left dead on the field, and we took 300 prisoners, among whom was the commander in chief, Mustapha Pacha, who was wounded in the hand. I immediately dressed him, and attended carefully to his wound until he had perfectly recovered.

Our army had eight hundred wounded, besides generals Lannes, Murat, Fugieres, and many commandants of brigades and battalions.

Cretin, chief of brigade, and Guibert, aid to the general, were mortally wounded, and survived but a few hours. The former had the brain injured by a ball. The latter, while near his general, was wounded in the thorax by a ball. General Leture also fell. M. Bertrand,* chief of brigade, narrowly escaped: a ball glanced on his cranium, and removed a portion of the integuments.

During the engagement, the *ambulances* were placed at the principal points on the line, and gave immediate assistance to the wounded. I then united them to that of the centre, which I had placed as near as possible to the fort. The most severe wounds were all brought to this *ambulance*. I dressed them myself, and performed the necessary operations. More than forty amputations were immediately performed, and with astonishing success. Among these were more remarkable cases than I have elsewhere met with. The wounded after this affair, received the most prompt and effectual assistance from the

* Now aid de camp to Bonaparte.

surgeons of the *ambulances* and of the line; none were left more than a quarter of an hour without being dressed. They were then carried on litters to the boats which were conveniently moored in a creek, out of the view of the enemy's squadron, and transported to Alexandria without accident. Thither I also repaired, with general Fugieres, who was severely wounded. I gave him a place in the hospital which had been prepared, and directed the treatment of his wounds during the two first stages, viz. for the first fifteen days, and he was afterwards attended by my coadjutors.

The Turkish fleet immediately weighed anchor, and set sail towards the east. Our army returned to Cairo with the general, where I joined it a few days after. I hastened to prepare the grand hospital on the lands of Ibrahym Bey for the reception of the wounded, and I re-established the school of anatomy and practical surgery, the lectures of which had been suspended during the campaign of Syria.

General Bonaparte celebrated the victory of Aboukir by a festival which he gave to his officers, and then informed us of his intention to inspect the sea coasts from lake Burlos to Alexandria. On the 22d August of the same year, he embarked for France, and gave the command of the army to general Kleber.

General Kleber pursued the plan of Bonaparte, and completed the useful institutions established by his predecessor, and matured the organization of the commission of publick safety. To the wise regulations of this commission, many of our troops owed their safety; and by them was the plague prevented from being carried into Europe. General Kleber ordered all the invalids to be formed into a corps, that they might be sent to France.

After the battle of Aboukir, we had promised ourselves repose; but we were informed that the grand vizier had marched a considerable army to the frontiers of Egypt. Our garrison of El Arych, surrounded on all sides, and cut off from supplies, was soon obliged to surrender. A capitulation was proposed, which the enemy accepted, but immediately violated. The greater number of our men were beheaded. These barbarians did not even respect the surgeon, but cut off his head while he was dressing one of the wounded.

On the receipt of this unexpected news, the general on the 8th January marched for Salehyeh with all the efficient troops, and there formed a camp of observation, reviewed his army, and announced his intention of returning in a short time to France. General Desaix and M. Pousielgue were empowered to negociate a peace with the grand vizier, and the ministers of the allied powers.

While these negociations were pending, we received information by the gazettes, that Bonaparte had arrived in France, and had been made consul.

A convention was concluded at El Arych, and ratified by the representatives of the contracting parties, and we prepared without delay to evacuate Egypt. Our troops were soon united in the city and environs of Cairo. One division had already passed to the west bank of the river, and the remaining troops were ordered to follow as soon as the citadel should be evacuated, while a fleet of Turkish vessels repaired to Alexandria and Aboukir, to carry us to France.

Just as the citadel and other fortifications were to be given up to the enemy, and the remainder of the army was about to cross the river, the general received a letter from admiral Keith in which he declared, that by an order from the English government, the French army

could not be permitted to pass except as prisoners of war. This news was published in the orders of the following day, and excited the indignation of the whole army.

Orders were immediately given to re-convey the provisions, artillery, and munitions of war into the forts of Cairo, and to assume an attitude of defence. The battalions which had been ordered to descend the river to Alexandria, were countermanded. The troops being united at Cairo, the general sent an officer to the grand vizier, who had advanced to Matharieh, to make him acquainted with the contents of Lord Keith's letter, and to inform him, that in consequence of this event, we could not quit Egypt until we had secured a passage to France. The general also demanded hostages for the removal of his army ten leagues from the city, until our departure. These conditions were not agreeable to the grand vizier, and he answered that he would not retire, as his retinue was at the gates of the city, where he then was. No doubt of the enemy's intentions was now entertained. General Kleber ordered the necessary preparations for a vigorous attack, which would be made as soon as the convention was broken. We were moreover threatened with a new revolt of the inhabitants of Cairo, or rather of the Turks, who had been secretly introduced. One of our grenadiers had been assassinated, and the French merchants had suffered vexations.

On the evening of the 20th November, 1799, orders were given to take up the line of march. The general having made Mustapha Pacha, the commander of Cairo, his friend, and having collected all the soldiers in the forts and the citadel, set forward in the night with thirteen thousand men, and before day we had reached the desert of Qoubbeh; as we passed near fort Sulkouski, we left there the baggage which might retard the army. We soon arrived near the enemy, who was encamped

at Heliopolis and the village of Matharieh, which served them for an entrenchment.

After some manœuvres on our part, and a discharge of artillery, the Turks were put to flight. The mamelukes and a part of the cavalry retreated to Cairo, and entered it without resistance.

The body of troops which was with the grand vizier, and his principal generals, was vigorously attacked in its entrenchments, and a very severe conflict took place, but continued only for a short time. This was called the battle of Heliopolis, because it took place on the ruins of this ancient city.

The remainder of the enemy, with their commander in chief, fled to Syria.

We had fifty men wounded in the action. As soon as they had received the necessary assistance, I had them transported to fort Berket-el-Hadj, where they were provided for until our return. Their wounds presented nothing worthy of notice.

Fort Belbeys made but little resistance. We had three or four men wounded, with some of the enemy's garrison, which we found here. They all received the same care and attention. Among the latter was a mameluke of Mourad Bey, who had his left arm struck by a cannon ball. The primary symptoms were making their appearance, and the arm which remained attached by a portion of the integuments only, was threatened with gangrene. I amputated the remaining portion of the arm at its articulation with the scapula, after the manner which shall be described. This mameluke was cured in twenty-five days, and returned to Mourad Bey a short time after.

We pursued the enemy, but could not overtake him. As the head-quarters in which I was, were marching detached with an escort of about two hundred and fifty men, it was surprized while passing before the village of

Coraim, by two thousand of the enemy's cavalry, which charged upon us with the greatest impetuosity. Scarcely could the vigorous resistance made by our flying artillery and the detachment of cavalry, afford time to the commander in chief and the officers of the etat-major, by a rapid march to re-unite with Regnier's division, then but a short distance off.

In this engagement I was exposed to the most imminent danger. My servant had his head cut off near my side. It was carried off together with twenty others of our cannoniers, who were killed in this affair, and we saw them next day exposed at Salehyeh, in the camp of the grand vizier, whither they were carried.

We also had seven or eight wounded severely, among them lieutenant colonel Paultre, aid de camp to the commander in chief. Besides many sabre wounds, he had a wound from a lance, which, after having penetrated through the os scapulum, had entered the thorax and wounded the lungs. This officer was perfectly cured at the end of six weeks.

We were confident that a large part of the troops that followed the grand vizier, perished of hunger and thirst in the parched and scorching deserts which separate Syria from Egypt. They had not time before they left Salehyeh, where they had abandoned their camp, to provide themselves with provisions and water.

Such was the fate of this great army, which at one time covered all the plain of Matharieh. Another division of these troops having retreated to Damietta, general Belliard pursued, destroyed, and took them prisoners without the loss of a single man.

From Salehyeh we returned to Cairo by forced marches, urged on by hunger which had distressed us for several days; the want of our wagons having prevented us from providing provisions. What was our sur-

prize, when after arriving at this city, we found it defended by more than 50,000 Turks or mamelukes, and by the inhabitants who had joined them! They had fortified the avenues of Cairo, and had strengthened its entrances by strong stockades, and well armed batteries.

Boulaq had also revolted, and was fortified in a manner similar to the capital, and we had to open the siege of it in form: it proved long and arduous.* After several attacks, general Belliard carried this small town by assault. It stands on the bank of the Nile, and is one of the suburbs of Cairo. We had here but twenty men wounded, among whom was general Almeras, severely: his recovery may be principally ascribed to the assiduity and dexterity of the surgeon who attended him. A ball in passing through the thigh, had injured the sciatick nerve, cut off the lesser trochanter, and had produced by its shock, or by the lesion of the nerves, a paralysis of the bladder, whence followed retention of urine, collections of it in the perineum, and other alarming symptoms. Yet he was cured after six months of close attention.

Immediately after the taking of Boulaq, we made an unsuccessful attack upon the city of Cairo. We lost a number of men, and had more than two hundred wounded, some of them very severely; among whom was general Belliard, who received a shot in the abdomen. The ball in entering the abdomen, passed near the left side of the pelvis. The sigmoid curve of the colon was wounded, yet no alarming symptoms supervened, and he re-

* Before our arrival, the enemy had made many attempts to carry the fortress in which were our sick and our head-quarters. In it also was the Pacha as a prisoner of war, and the baggage of the commander in chief. My colleague, baron Desgenettes, who had remained at Cairo, in one of the attacks, while assisting the wounded, received an injury from a ball which grazed the cranium. Fortunately, this injury was productive of no bad consequences.

covered and was well on the forty-sixth day after the accident.

Under the article of *wounds*, I shall notice many other remarkable wounds.

The besieged who were much straitened, and were incessantly bombarded, demanded a capitulation, which was granted, and on the 20th April, they marched out of the city with the honours of war, and went directly to Syria.

During the siege of this place, where we suffered many privations, I had an opportunity of observing for the first time, the effects of a species of yellow fever, of which I shall speak in this place.

Of the yellow fever complicated with gun-shot wounds.

The fatal consequences which took place in a great number of our men who were wounded in the battle of Heliopolis, and at the siege of Cairo in 1800, led our soldiers to believe that the balls of the enemy were poisoned. It was not difficult to undeceive them. But not so easily could we arrest the progress of this disease.*

It presented all the symptoms of the yellow fever, observed in America, during the war preceding the last, and which, according to the report of my former colleague, M. Gilbert, physician general of the army of St. Domingo, re-appeared among the French troops with a similar character, during the last expedition to that island. In Egypt it had attacked none but the wounded, and more particularly those who had been injured in the articulations, or had fractured bones, with injuries of the nerves, of the head, of the abdomen or thorax. Simple

* We were without medicines, mild nourishment, bedding, and linen for dressings. The hospital of the fortress of Ibrahym Bey, where our wounded were, was crowded with the troops and the sick.

wounds of the face and extremities were not, in general, followed by any serious consequence. The disease appeared about the 5th of April, 1800, and disappeared about the last of May. I shall briefly detail the principal symptoms which it presented.

The wounded had scarcely received the first assistance, or submitted to an operation, when they fell into a state of faintness and anxiety; rigours were felt over the whole body, and especially in the inferiour extremities. At the first attack the eyes were heavy, the conjunctiva yellow, the visage copper coloured, and the pulse slow and contracted. The patient felt pain in the right hypochondrium, and his wounds were dry, or discharged a red serum. These symptoms were followed by much general heat, burning thirst, violent pains of the intestines and head, sometimes accompanied by delirium, frenzy, oppression, and frequent sighing.

The hemorrhage from the nose which sometimes ensued, alleviated these latter symptoms, and promoted the bilious vomiting, which took place with difficulty before this evacuation. Sometimes hemorrhages, followed by copious vomiting, and by alvine evacuations, arrested the disease, and produced a salutary crisis, but in general the fever, which came on at the same time, became more intense, and had an exacerbation towards evening. The thirst increased, the tongue appeared dry, and as if it had been burned; the eyes were red, the urine diminished in quantity, and high coloured—sometimes totally suppressed or retained in the bladder. The skin was tinged with yellow; the pains of the hypochondrium became more acute, and the abdomen painful and swollen: finally, the patient uttered mournful cries, was deprived of sleep, and was always restless, without being able to enjoy a moment's calmness or repose.

If the symptoms thus appeared, the disease generally had a fatal termination. On the second day, and sometimes on the first, the wound was affected with gangrene; the unfavourable symptoms were evolved in the first twelve hours which followed the injury, and the patient sunk on the first, second, or third day. The sudden approach of the mortification, and its alarming progress, gave rise to a belief among the soldiers and others, that the balls had been poisoned.

The effects of this disease appeared on opening the dead bodies: we found a reddish serum in the cavities of the chest and abdomen, inflation and inflammation of the intestines; obstruction of the liver and spleen; the gall-bladder contained but little bile, and this was thick and of a black colour; gangrenous affections were seen in different parts of the body, and especially in the adepose substanee. The organs of the thorax presented nothing remarkable: all the soft parts of the wounded limb were gangrenous, and emitted a nauseous and fœtid odour. Two hundred and sixty out of 600, who were wounded at the siege of Cairo, and the taking of Boulaq, died with a complication of this disease.

The yellow fever did not run on in every case with the same violence. The symptoms which I am about to describe, in some instances, were more gradual, and more varied. The *erethismus*, watching and nervous tension were superseded by a state of general atony snd drowsiness, and the constipation and pains of the hypochondria, by bloody or bilious alvine evacuations. When the type of the fever was less violent, the yellowness was more considerable. The disease was prolonged to the fifteenth day, and if it continued beyond this period, our wounded generally recovered. A kind of crisis by stool, by urine, or by perspiration then took place, which was favourable: all the symptoms immediately diminished,

a laudable suppuration was established in the wounds, and they healed without difficulty.

The sudden manner in which this disease seized on those who, with slight wounds, occupied the beds on which others had died, led me to believe that it was contagious; and that the contagion was generated more readily, in proportion as the disease was more advanced, and gangrene had taken place in the wounds.*

I have seen men who laboured under very slight wounds, contract the disease from lying in beds of which the linen alone had been changed, after being used by those who had it in its third stage. It suddenly assumed a serious character, and imminently endangered the lives of the men.

I believe that this contagion has not a sphere of action so extensive as that of the plague and contagious typhus, because it never appeared in the elevated wards of the first and second story of the hospital, in the fortress of Ibrahym Bey, where the cases of fever were. Indeed, Dr. Savaresy, under whose care these sick were placed, in his excellent work on the yellow fever of the Antilles, does not say he saw it in the hospital. Yet he assisted in opening the dead body of a wounded soldier, who died of the yellow fever, or at least of the disease, the principal symptoms of which we have sketched, such

* This deduction is not warranted by the premises. If the yellow fever be endemick, and arise from local causes, why is not one person as obnoxious to the causes of the disease as another, in the same atmosphere, and under the same circumstances? The wounds of the French soldiers, by weakening their systems, predisposed them to this disease, or to be more fully acted on by its causes. That a number of the soldiers have died in succession in the same beds, or the same hospital, will not be doubted, but this goes no further to support its contagious character, than the fact, that a great number of persons have died of this fever, in one or more cities of the United States, in a short space of time. —Tr.

as we also find, with a colour more or less varied, in the *typhus icterodes* of the French and English nosologists, or the *vomito prieto* of the Spaniards.

I also requested my colleague, M. Desgenettes, to visit my wards, and take notice of this fever, which formed so serious a complication with the wounds of our soldiers, who were at the siege of the capitol, but he was so much indisposed as to be obliged to confine himself to his chamber, at Gizeh: he therefore could not accept my invitation, and I had to regret the want of his advice in the treatment of this disease. Yet I have the testimony of the surgeons, my associates, to confirm the facts which I have detailed relative to its character, its progress, its contagious nature, and its consequences. If it be disputed that the yellow fever has existed in Egypt and Syria, where the plague is endemick, and where the climate is by no means favourable to the production of the former disease, I would answer that it arises from circumstances which are dependant on the changeable constitution of the atmosphere, and the vicissitudes to which the soldiers are exposed by the occurrences of war. These may produce such a sporadick disease, and for a short time supersede the endemick diseases. Some correct and very judicious opinions on this subject may be seen in the *Political Essay on New Spain*, by M. Humboldt—article *Yellow Fever*, in vol. iv. 8vo. edition.

The English who succeeded us in Syria and Egypt, appear also to have suffered, while there, from the yellow fever. But in order to enable the reader to judge for himself, I will relate the substance of what I extracted from the medical journal of Dr. Witman, a physician who was with the English military commission.—The translation is literal, and it was given me by one who is entitled to confidence.

This physician states, that in the autumn of 1800, while the military commission remained on the coast of Jaffa, where it was encamped with the army of the grand vizier, a malignant bilious remittent fever made its appearance. It commenced about the middle of August, and continued during the months of September and October. The weather was foggy, and very warm: Farenheit's thermometer, in the shade, rose to 90 and 95 degrees; the nights were cool and moist. The first victims of this disease were two of our artificers; it soon extended to the camp of the Turks, where it caused great mortality.

"The symptoms that appeared in this disease (says Dr. Wiseman,) were at first chilliness, pains of the head and prostration of strength; after these a burning pain of the stomach and abdomen, nausea, a bitter taste in the mouth, and copious vomiting of bloody and bilious matter, with a diarrhœa of the same appearance: the tongue of a yellowish black, an ardent thirst, the pulse quick and strong, the skin yellow and hot, and respiration hurried.

"When the fever assumed an unfavourable character, it was attended by delirium; the eyes were inflamed, and the skin often affected with dark coloured spots.—This disease advanced with more or less rapidity, according to the state of the mind and body, age, and particular regimen; also with many circumstances connected with the place and the atmosphere.

The consort of general Kochler, commandant of the commission, after the artificers, was one of the next attacked by this malignant yellow fever, of which she died on the seventh day. The general, her husband, who had paid her particular attention, after a few weeks had elapsed, also fell a victim to the same disease on the third day after the attack. It is true (says Dr. Witman,)

that general Kochler had mourned incessantly for the loss of his consort. In the months of November and December, the heat having insensibly diminished, this fever disappeared, to give place to the plague, with which these two armies entered Egypt, where it also appeared with unusual violence, as it was the season of the *khamsyn*."

I regret that I could not collect more circumstantial details relative to the individuals who were attacked by this malignant bilious remittent fever, and the results of dissections which might have been made by the English physicians.

I think that many causes concurred in producing the yellow fever among our wounded. The first was, crowding the hospitals: as insurmountable difficulties opposed the formation of other establishments, we could not remedy this. Besides, the wounded occupied the wards on the ground-floor, the moisture of which increased the disease. It did not appear in the elevated and airy wards to any considerable extent.

Moreover the troops, of which these wounded were formerly a part, were encamped on the west of Cairo, between this city and Boulaq, in a situation low and moist, more especially after the waters of the Nile had receded from a place where they had undergone decomposition, by remaining long exposed to the heat. The sudden transition from the scorching heat of the day, to the moisture of the night, to which the troops were exposed, necessarily tended to weaken them and predispose to the disease. The atmosphere, in the season of *khamsyn*, is hot and moist, and consequently injurious to health. At this time also the plague prevails, and we might say that the yellow fever, from the similarity of its effects, and its speedy termination, bears some analogy to this scourge.

The celebrated Dr. Humboldt who has seen these two diseases, the former in Turkey, in Syria, and in Africa, and the latter in New Spain, and even at Vera Cruz, has made the same remark. Indeed, if we compare the phenomena of the two diseases when they are acute, and attack persons of the same age, and of the same sex and temperament, we shall find in the first stage that the anxiety, the restlessness and inquietude of the patient; the pains of the head, of the loins and hypochondria, the vomiting, the redness of the conjunctiva, the burning heat of the intestines, the dryness of the skin, the hardness and frequency of the pulse are, with some variations, nearly the same in the plague and in the yellow fever.

In the second stage, the prostration, the faintness interrupted by the accession of delirium, the total suspension of the animal functions, the sensible alterations of the organick functions, indicated by the dyspnœa, the palpitations, the convulsive vomiting of black and nauseous matter, the suppression of the alvine evacuations, and afterwards involuntary and colliquative discharges, and irregularity of the pulse, are also symptoms common to these two diseases. In this stage, the one is characterized by a yellow colour, which appears and extends over the whole surface of the body: the other, by livid spots, petechiæ, carbuncles or buboes, which may likewise occur in the yellow fever, but much more gradually: buboes and carbuncles seldom occur, but petechiæ frequently in the third stage of the disease.

In the third stage of the yellow fever, there is an almost total failure of the vital powers, in consequence of a paralysis of all the nerves of animal life: The sphincters lose their power: the discharges are involuntary. The gangrenous disposition is evinced by the solutions of continuity when it takes place, or it attacks the cellular or cutaneous tissue, the organs of digestion, and successively

those of internal life: the machine is disordered, and falls into a state of dissolution which accelerates general death.*

To these causes already enumerated, we might add the excessive fatigue of the soldiers, the deficiency of good aliment: of cooling remedies and acid drinks, and the want of cloaks to cover them during the night.

The surrender of Cairo having re-established all the communications, we were enabled to form new hospitals, and to procure good aliment, medicines, linen and bed furniture. We removed a great part of our sick to other establishments. These circumstances, and the return of the wind to the north, soon caused the disease to disappear.

When the yellow fever was acute, and presented the symptoms of an inflammatory fever with jaundice, spasmodick vomiting, delirium, &c. dry scarifications on the ligamentum nuchæ and on the hypochondria, produced very good effects,† or in lieu of them, a small quantity of blood was taken from the arm. *But copious blood-letting was fatal,* and it was even necessary to use the greatest circumspection in the first detraction of blood.‡

Nitrated tamarind water, sweetened with honey or sugar, or a few glasses of nitrated and anodyne campho-

* The reader in order fully to comprehend the meaning of this sentence, must be aware that our author makes a distinction in common with some other French writers, between organick and animal life of the body, as being in a great degree in their functions and powers independent of each other. See Bichat's Physiology.—Tr.

† Leeches to the margin of the anus might have been, without doubt, advantageous, had it been possible to procure them.

‡ These observations relative to the effects of venæsection in the bilious remittent, or yellow fever, are confirmed by the testimony of many of the most intelligent physicians in the United States.—Tr.

rated emulsions taken at night, relieved thirst and moderated intestinal irritation. If in conjunction with these remedies, the bowels were moved in the first twenty-four hours, we had hopes. We then continued the use of cooling medicines, of anodynes, of antispasmodicks, followed by laxatives of neutral salts, and calomel, and tonicks, and antiseptick by degrees. Emeticks would have been pernicious. But if in opposition to these means the symptoms increased, the disease terminated fatally.

When on the contrary, the disease commenced with ataxick symptoms, such as prostration of strength, faintness, chilliness, blackish tinge of the tongue, and constipation, emeticks in gruel removed the spasm, re-established the powers of the stomach, and facilitated the action of tonicks and antiseptick: we then exhibited these latter with some success; chinchona, camphor combined with opium, Hoffmann's mineral liquor, and bitters in suitable doses. The cortex appeared to be less effectual than good wine brewed with sweetened lemonade, and to which a portion of ether was afterwards added.

Coffee was to us highly useful, and we employed it to great advantage when the disease had passed the second stage, when suppuration was re-established in the wounds, and the patient was on the recovery. It expedited in these cases, the return of the vital powers, and gave nourishment. These means were persevered in, and their use modified at every stage of the disease. spurge-laurel and mustard, pounded with vinegar, and applied on the hypochondria or back, co-operated greatly with these remedies. In this disease, I remarked the injurious effects of cantharides; therefore I seldom used them.

Wounds complicated with bilious fevers, were dressed according to the particular indication. They were sprinkled with camphor and bark, when they were

threatened with gangrene, and we used the vegetable acids, chiefly of the lemon, which is abundant in this country. If they assumed the symptoms of putridity, I also ordered lotions of vinegar strongly camphorated, to be used on the head, and over the surface of the body.

Those who survived the yellow fever, had a tedious convalescence: some even had relapses, and died in a few days The yellow fever did not spare the Turks who were wounded. Being requested by the commander in chief, after the surrender of Cairo, to afford them assistance, I had them all collected in one mosque,* to dress them more conveniently.

A large proportion of the wounded Turks who were attacked by this disease fell victims to it. We may attribute these unfortunate results to the bad treatment to which they were subjected, and to the privations which they underwent during the siege.

SECTION V.

We had reason to expect that the battle of Heliopolis would afford us a long period of tranquillity, but in a short time we were again attacked. A chosen body of Turkish troops, directed by Sir Sidney Smith, effected a descent on the coast of Damietta, near Boghasse, and had it not

* I intrusted the medical care of this mosque or hospital, to M Balme, surgeon of the 22d demi brigade, who finally as a recompense for his zeal and talents, attained the title of physician *in ordinary* to the army.

M. Balme noticed the yellow fever among the wounded Turks who were attacked by it at the same time with the wounded French soldiers. He admits that to a certain degree it is contagious, and bears some analogy to the plague. Vid. *de ætiologia generali contagii*, &c. p. 43.

been for the vigilance of general Verdier, commanding the division, they would have gained the interiour. This general gave the 2d and 32d demi-brigades the word, and they bravely charged on the Turks, though much more numerous, with such ardour that the enemy's ranks were soon thrown into confusion and dismay. Their columns were broken, and after a very short contest, one part of them bit the dust, and another part were taken prisoners. The rest threw themselves into the water to regain the ships. The result of this affair was completely fortunate. We had here but few wounded, and in general the wounds were not complicated, and the operations which were required were followed by success.

The wearisome campaigns which we made, the privations, and the burning heat which we experienced in the deserts, in those who were corpulent, produced a remarkable alteration in the adipose substance of the omentum and the cellular texture. The effects of this change extended immediately to the liver. In a short time its delicate and extensive vascular and glandular apparatus, which on account of its numerous ramifications, is removed from the general systaltick motion, became obstructed and inflamed. This inflammation from its violence and rapid progress almost always terminated in suppuration, especially when the sick did not receive the necessary assistance in due time. The irregularity of the symptoms which attended this affection, and the insufficiency of the remedies recommended by authors, led me to institute more minute inquiries into its causes and effects in order to arrest its progress. It was necessary to plunge a cutting instrument into the abdomen in order to reach the abscess which followed this inflammation. The abscess and the inflammation which preceded it, are the subject of a memoir which I wrote during the clinical

lectures which I gave in the hospital of the fortress of Ibrahym Bey. I here insert my observations on this disease.

Of Hepatitis.

Hepatitis commences by an attack of fever, attended with flying pain and a kind of transitory dyspnœa, with loss of appetite and faintness. The season and the intense heat of the climate principally induced these first symptoms. Their progress is more or less rapid, and they are followed by a general and speedy emaciation. The skin becomes dry, the colour of the patient yellowish: the abdomen tumefied, and digestion slow and difficult. A painful part is soon perceived in the hypochondria, more especially in the right. In this region the pain is accompanied by a sensation of weight, which increases when the patient lies on the opposite side, or when he is erect. The pain becomes more severe when pressure is applied to these regions, and if the inflammation is seated in the convex surface of the liver, it is often propagated along the diaphragmatick nerve, and the accessory nerve of Willis on the same side, in consequence of the reciprocal communications of these nerves. By this sympathy we account for the pain of the shoulder, which is not always constant, and rarely takes place when the inflammation is confined to one portion of the lobse edge of the liver, or its concave surface. The fever commences with internal heat, painful respiration, anguish, and frequent retchings to vomit. The liver acquires so great a volume, that it extends below the false ribs, and forms a prominence under the hypochondria. The external parts are painful, and there is commonly a retention of the bile in con-

sequence of the copious secretion of this fluid, which is produced on the first appearance of the symptoms, and the spasm which affects the intestines and the ductus choledocus from the heat and fever.

A fluctuating tumour is sometimes formed below the false ribs, which may be mistaken for a hepatick abscess. This symptomatick tumour generally disappears from the use of remedies to remove inflammation.* If this tumour increase, all the symptoms continue to become more violent until the eighth, ninth, or tenth day, or later. The pains become poignant: the fever is higher, and has remissions towards the evening. The urine is tinged of a reddish colour, and is evacuated with difficulty. Sometimes a diarrhœa attends, and the stools are tinged with bile slightly coloured. The secretion of this fluid is suppressed: the bile being probably absorbed by the lymphatick vessels, is carried to the surface; hence a general jaundice takes place. The spleen participates in this disease, for I have in many subjects remarked that it was obstructed in a manner similar to the liver: it is true that this obstruction yields to the exhibition of more feeble remedies.

When inflammation terminates in suppuration, the symptoms of the former gradually decline and disappear, but are succeeded by thos of the latter. The fever assumes an intermittent character. Rigours are felt in the extremities; the anguish and weight increase; the pains are less acute, but more throbbing: the tongue is covered

* The retention of the bile occasioned by the presence of biliary concretions which lodge in the cystick duct or in the choledochus. produce symptoms analogous to these. The essential oil of turpentine and acetick or sulphurick ethers taken internally in the yolk of an egg, or some suitable vehicle, or applied externally with emollient cataplasms, cause the dissolution of these calculi, and facilitate their passage through the intestines.

with a whitish fur. When the abscess is formed in a part of the loose edge of the liver, or towards its concave surface, it commonly makes an angle under the false ribs, and the fluctuations may be felt through the muscular walls of the abdomen.

If the abscess is formed on the convex surface of the liver, it points towards the cavity of the chest; it absorbs and perforates the diaphragm, and distends the pleura, which it presses towards the interstices of the ribs, and the two corresponding membranes form adhesions. The pus, escaping under the intercostal muscles, makes its way from the cavity, and appears under the integuments.

Here the abscess shows itself by a tumour, more or less sensible, deep or superficial. It has a fluctuation in the centre, and its base remains hard. The change of colour in the skin is caused by the quantity of pus which is accumulated, or by its bad quality, altering the integuments. In pressing this tumour, especially if the subject be irritable, a pulsation may be felt, which increases according to the degree of pressure.

This fact which I have often observed, might cause this abscess to be mistaken for an aneurism: but by atten tion they may be easily distinguished—for the vessels of the parietes of the abdomen and thorax are very small, and so disposed as not to become aneurismatick, and the principal arteries which run through these cavities could not form tumours so large as to project into the region where these abscesses appear. When these pulsations are small and constant, they are caused by arteries which are situated near the walls of the cyst; but those which are excited by some irritating cause, or by pressure, depend on a spasmodick action which takes place in the cyst, or in the contiguous membranes, where the sensibility is very great on account of the disease of the

parts. This is so true, that when pressure is removed from the tumour, the pulsations cease, and may be reproduced by the same cause. Attention to the progress of the abscess of the liver, will enable us to distinguish it from aneurism, which presents symptoms entirely of a different character.

The abscesses which communicate with the thorax have a particular cyst, which commonly prevents their contents being poured into this cavity: sometimes the inferiour lobe of the lungs forms adhesions with the diaphragm, where it is in contact with the abscess; and when the pus has destroyed the substances which defended the lobular tissue of this viscus from the purulent action, the matter passes into the bronchial system, and may be thrown out by expectoration. These cases are rare: we more frequently find that the pus, after having penetrated the diaphragm, is poured in the cavity of the chest, and forms a purulent empyema. This particular case is attended by signs common to phthisis and to empyema.

Abscesses of the abdomen, when they take place below the circumference of the liver, also form a cyst, which increases in size and thickness according to the accumulation of the fluid in it; but when this accumulation goes on to a great extent, the walls of the cyst are ruptured, and the pus is effused into the superiour cavity of the abdomen. Death soon follows this accident, as I have often witnessed; and hence it is evident that we should not delay to open the abscess.

But it sometimes happens, also, that the walls of the abscess form adhesions with the stomach, and more frequently with the transverse colon; the pus flows into their cavities, and is evacuated by stool; of this I have seen many instances. A case of the wife of a serjeant of the miners was particularly remarkable for

terminating fortunately in this way. I shall speak of it hereafter.

It was all-important to be acquainted with the different causes which produced hepatitis in Egypt, as they might have remained a long time unknown to physicians.

The scorching heat of the day acting with more violence on corpulent persons, transmitted a large portion of calorick into the adipose substance, which becomes liquified and *hydrogenified*, if we may so express it. The spasmodick motion and contraction which take place in the adipose membrane, and in the skin, produce a uniform compression in a greater or less degree, on this humour enclosed in the cells of its membranous tissue; a spontaneous movement there takes place, and it tends to escape where the least resistance is offered. The adipose matter, principally that with which the epiploon is filled, disappears as we find by the sudden emaciation of the subject: the liver is the first to be affected by this change of the adipose substance: it appears that the elements of this adipose matter, being carried back in the circulating blood, are deposited in the liver to the functions of which those of the epiploon are also analogous. This viscus is clogged by the extraordinary accession of these fluids, or the hydrogen and carbon are in excess: hence a focus of heat and irritation are produced, and obstruction and inflammation of the liver are the consequences.

Thus, in order to procure the livers of geese of an increased size for pies, these fowl, when fat, are confined in small cages, and then exposed to a graduated heat, while they are deprived of all kinds of nourishment, and even of water. A fever takes place: the fat undergoes a kind of fusion: the liver is obstructed, and increases to an enormous size; when the animal becomes extremely lean and the fever has increased, the liver has attained the wished-for size.

Wine taken in large quantities, and spirituous liquors are generally the destroyers of health in Egypt: hence it is proper that the koran should forbid its use. These liquors assisted greatly in conjunction with the heat in producing hepatitis: they stimulate the digestive organs, whose sensibility is extreme in warm climates.—The systaltick action of the vessels is increased, and there ensues an irritation in the different organs, and especially in the liver, which is the most disposed to feel the effect of the translation of adipose matter. The abuse of these liquors produces diarrhœa, and if it be suddenly checked, hepatitis is the consequence.

The brackish water, of which our soldiers in garrison at Soueys and at Qatyeh made use, might contribute to the production of this disease; for the 61st and 69th demi-brigades which remained there the longest, had the greatest number attacked by hepatick abscess. It appeared that the unwholesome water disordered the biliary system, and disposed it to obstruction.

To these causes may be added, the suppression of perspiration, caused by the sudden transition from heat to cold, excessive fatigues which we underwent during our marches through the deserts of Lybia, or the frontiers of Asia; the immoderate use of mercurial frictions in venereal cases, improper or untimely venæsection, and strong purgatives and emeticks.

Temperate persons of a dry constitution, were generally exempt from this disease.

The prognosis varied according to the character of the hepatitis, the state of the patient, and the season. The *khamsyn* is injurious to all diseases, and especially to hepatick affections: their progress at this time is rapid, and they who are attacked by it, soon die.

When inflammation has not long continued, resolution may be effected; but if the abscess be formed, we need

only watch it until it become mature, and then give vent to the pus. In the first case the patient should be bled in proportion to the plethora of his habit, his strength, and the violence of the inflammation. In general, venæsection is less indicated in warm, than in cold climates, and for this reason it should be used with great caution.

If the subject be weak, leeches should be substituted to bleeding, and if these cannot be had, dry scarifications under the hypochondrium: the pain may be moderated, and the obstruction of the liver relieved by emollient cataplasms. To these first remedies should succeed anodyne enemata, camphorated and nitrated emulsions, the use of cooling and acidulated diet and drink, and washing the whole surface of the body with warm water, acidulated with vinegar.

After pursuing this treatment for two days, we gave the patient, in the morning, some clarified milk-whey, tartrited and brewed with fermitory; the enemata were made purgative, and a small quantity of tamarinds was added to the diet-drink.

When resolution takes place, the fever abates, the heat and pain diminish, and the external tumefaction, if it exist, gradually disappears.

By the relaxation of the parts, the secretion of the bile is restored; it flows into the intestines, and re-establishes the alvine excretions: the continuance of these means, with regimen, generally effects a cure.

If, after the cessation of the first symptoms, it be difficult to effect resolution, an epispastick plaster should be applied over the hypochondrium.

Towards the conclusion of the treatment, I direct gentle purgatives of the class of neutral salts, such as the acidulated tartrite of potash, mixed with whey; sulphate of magnesia, sulphate of soda, or sweetened tamarind water; at length the resolution is effected by a perseve-

rance in these means, prescribed according to circumstances, by rest and regimen. The epispasticks on the hypochondria, after having calmed pain, and diminished turgescence, accelerated resolution.

These epispasticks should be made of spurge-laurel, euphorbium, or of some other substance which produces the same effect: cantharides, by stimulating the solids, decompose the fluids, more especially when there is putridity, or a bilious diathesis. Indeed the sick, to whom blisters have been applied, were cured with difficulty; the disease became complicated with putrescency, and the convalescence was long and painful. Those, on the contrary, to whom we applied ammoniack, boiling water and spurge-laurel, for want of cantharides, were exempt from these symptoms, and recovered more speedily.

Dumas, the celebrated physician at Montpellier, has proved by a series of observations and experiments, that cantharides are injurious in all bilious diseases.*

If the inflammation resist all these means judiciously applied, we should assist nature in establishing suppuration as soon as possible: this is characterized by all the symptoms of which we have spoken. For this purpose the strength of the patient should be supported by appropriate medicines; emollients should be applied externally, and the bowels kept free by enemata.

If the abscess open in the cavity of the abdomen, the patient is in great danger. It is nevertheless possible, that the pus, communicating with the cavity of the co-

* See the works of the Philomatick Society.

Experience certainly shows, that if vesicatories be applied to the surface of the body, while there is great arterial action, they prove injurious by their stimulating effect. Perhaps there is no article of the materia medica, which at the present day is used by physicians, more *empirically* than the cantharides. Yet it must be admitted, that their application in certain conditions of the system, have produced the happiest results.—Tr.

lon, in consequence of inflammation, may pass off by stool. In this case, repeated clysters, mild regimen, and light stomachicks will assist nature. But if it open into the cavity of the thorax, the operation for empyema should be performed; the case will then be treated as is usual.

If the abscess point below, in some part of the hypochondrium, and the fluctuation be perceptible, and if we be satisfied that the tumour is not formed by the distension of the gall-bladder from a retention of bile, we should open it. The ancients being afraid of injuring the organs, or of subjecting the sick to subsequent hernia, used the actual or potential cautery to open the abscess. They intended to produce a considerable loss of substance, which might facilitate the exit of the matter, and might still prevent the introduction of the external air. This plan is attended with serious inconveniences: caustick acts only on the skin, which it destroys to a great extent, and the loss of substance, which is the consequence, makes the patient still more liable to subsequent hernia: the aponeuroses, the muscles, and membranes subjacent, are with difficulty destroyed; the pus is discharged with difficulty; the wound becomes fistulous, and the cure is slow and uncertain.

The most proper plan is to open the abscess with a cutting instrument. The integuments are then cut in the most suitable direction in a line with the body, and the principal motions of the trunk. The muscles and membranes are then divided in parallel lines, and the opening in the sac is in proportion to its size at the most depending part of it, care being taken at the same time not to touch it where it adheres to the corresponding portion of the peritoneum in order that the contents may not be poured into the abdomen, nor the intestines escape. This opening may be enlarged above, as circumstan-

ces may require, or a counter opening may be made at the bottom of the sac, if it be deep. The incisions of the teguments of the subjacent parts and of the walls of the cyst should be kept exactly parallel: we should avoid making a large opening, or if possible, prevent all the matter of the abscess from being discharged at once. The fluid which is discharged is commonly of a greyish colour; but the colour is not always the same, being sometimes deeper and again lighter, and more or less uniform. In order to facilitate the evacuation of the matter, the patient should be placed in a convenient position, and the abdomen gradually compressed by means of a bandage round the body.

The dressings are simple, and consist of a piece of linen with an opening through it, placed over the wound, lint compresses, and an appropriate bandage. These dressings should be frequently renewed.

It is not necessary to use injections as recommended by some practitioners: they might tear the tender and vascular tissue of the liver, whence would result slight hœmorrhages and an additional irritation and augmentation of inflammation and all the symptoms that attend it. During the first days the suppuration is copious: after this the colour of the matter changes and becomes laudable. From this period the ulcer of the liver may be considered as cleansed, and in a healing state. Until this time, the dressings should be dry, and afterwards a mixture of wine and honey should be used, and in order to prevent the adhesions of the lips of the wound, before the internal parts are healed, a piece of soft linen moistened with the same fluid, should be introduced. Bitters should be taken internally and the cure assiduously watched.

I will notice a few cases of cure from these means.

A serjeant of the 22d demi-brigade of light infantry, entered the hospital in the fortress of Ibrahym Bey, with

all the symptoms of hepatitis. A fixed pain in the hypochondrium, dryness of the skin, general emaciation, fever, tension of the abdominal muscles, constipation, and discharge of orange-coloured urine.

This man had been debilitated by the use of emeticks and purgatives: suppuration took place immediately, in defiance of the means which I used to prevent it.

A few days after I found a fluctuating tumour below the cartilage of the last true rib, near the rectus muscle. To these symptoms were added all those which indicate the formation of hepatick abscess.

The two first days emollient applications were made externally, and soothing drinks were taken. I proceeded then to open the abscess; I cut through the integuments and cellular membranes by an oblique incision which extended from the insertion of the rectus muscle into the cartilage of the ribs to the bottom of the tumour below. This incision exposed the great oblique muscle which I cut with the subjacent parts parallel with its fibres, and I began to discover the tumour which might have been taken for an aneurism from its throbbing during the operation. This throbbing stopped me for a moment, but as I knew its character to be different from the pulsations of aneurism, (as I explained before,) when it ceased, I plunged the bistoury into the tumour. On opening it, a large quantity of matter of the colour of wine-lees flowed out, mixed with flocculi of white pus. I enlarged this opening above and below; and after having introduced the finger into the cavity of the abscess, I found a deep extensive erosion in the middle lobe of the liver, near the suspensory ligament.

From this moment, the patient was relieved. During a few days the suppuration was very copious, and of an uniform appearance; its quantity then diminished gradually, and the matter changed colour in a very short

time. The cure was completed on the forty-seventh day after the opening of the abscess, and this soldier left the hospital perfectly restored.

A soldier of the 69th was admitted into the same hospital with a similar disease; the abscess was opened as soon as the fluctuation became perceptible. I pursued the same process and the same treatment, and he was also cured in less than four months.

In the case of a grenadier of the 88th, a hepatick abscess formed on the convex surface of the liver and made its appearance on the space between the ribs below the hypochondrium, where a fluctuation was perceived. I opened it, and had then an opportunity of witnessing the passage of the pus into the chest, through the diaphragm which I found perforated opposite the interval between the sixth and seventh ribs.

The progress of this abscess was the same as that of the preceding. Its contents were of a similar colour, and the cure was effected by the same means.

Ten or twelve cases such as these were admitted into the same hospital. The disease had the same favourable termination.

I will notice a spontaneous cure of another case. The wife of a serjeant of the miners consulted me for a painful tumour which she had below the right hypochondrium. This tumour formed a perceptible projection below the border of the false ribs. It fluctuated in the centre, was renitent, and very painful at its circumference. The patient had felt for several days, cholick-pains which appeared to arise from this tumour, and extend towards the pelvis. This general irritation determined me to defer the opening of the abscess. I only prescribed emollient enemata which gave great relief, cooling and anodyne drinks, and the application of emollient cataplasms to the tumour. After two days of this treatment, the patient

suddenly felt violent pain towards the bottom of the abscess, which was followed by copious and frequent stools, composed almost entirely of a purulent matter, similar to that which was discharged from the abscesses that I opened as above detailed. She immediately felt relieved, and her pains vanished; but the purulent matter continued to be discharged by stool. Nature was assisted by emollient enemata, by regimen, and the internal use of light bitter tonicks. This case though fortunate, should not deter the surgeon from following the rules which we have laid down in treating hepatick abscess when it is within the reach of art; for a crisis so favourable as this seldom happens.

A corporal of the fourth demi-brigade of light infantry, with hepatick abscess, remained a long time in the barracks without making his disease known. He was taken to the great hospital in the last stage. The circumstances which had preceded, and symptoms of an effusion of pus into the thorax, made me resolve to perform the operation of empyema between the sixth and seventh rib counting from below upwards. I met with the collection of pus, and by this opening, a large quantity was discharged of a brownish colour, mixed with white and cellular *flocculi*. The patient who was almost suffocated, now breathed more freely; the oppression was less, but the prostration remained the same: after several days of composure and abundant suppuration, he died in a state of exhaustion. On opening the body, I found the pleura ulcerated with a small portion of the lungs which were reduced to a very small size. An opening about the size of a sixpence appeared below the tendon of the diaphragm on the right side, and communicated with the middle portion of the convex surface of the liver, which was deeply ulcerated. If this operation had been performed as soon as the pus was poured into

the thorax, this soldier might have been saved. This is more probable, as according to the report that was made to me several days after his reception into the hospital, a fluctuating tumour of the size of a hen's egg had appeared in the space between the ribs, where the opening was subsequently made.

Many persons would not permit us to open these hepatick abscesses, and died from the disease. On opening their bodies, we found the pus poured into the superiour portion of the abdomen, and confined by the mesocolon. They who were operated on in due time, were perfectly cured.

Peter Cinna, a cannonier of the fourth regiment of foot-artillery, came to the hospital in the fortress of Ibrahym Bey with a supposed dysentery which had resisted a variety of treatment prior to his entrance into the hospital. Astringents which were immediately prescribed suddenly arrested the dysenterick flux. A metastasis to the liver was the consequence, characterized by acute and deep-seated pains, which were shown to be in the hypochondrium by a general uneasiness and difficulty of respiration. Constipation ensued, internal heat, ardent thirst, fever and watchfulness; increase of pain, and in a few days a hard renitent tumour appeared below the cartilaginous border of the false ribs, and near the xiphoid cartilage, which was painful, without a change of colour in the skin; but in twenty-four hours afterwards it presented a fluctuating part near the centre. The first symptoms that attended the inflammation of this organ, gave place to those of suppuration, which were throbbing pain, irregular rigours, slow fever with an evening paroxysm, paleness of the countenance, loss of strength and increase of the tumour. Such was the state of the patient when I first saw him. After having ascertained the existence of the abscess, I hastened to open it in order to

prevent the rupture of the cyst and the discharge of its contents into the abdominal cavity. The slight pulsations which the tumour gave, received no attention, for the reasons before given in this memoir. I plunged my bistoury into the most fluctuating part, and extended the incision about two and a half inches above and below. This operation was immediately followed by the escape of a large quantity of greyish matter, inclining to brown, mixed with white and cellular flocculi. With my finger I examined the cavity of the abscess; it extended upwards to the middle lobe of the liver, the loose portion of which was also ulcerated several lines in depth. At the first dressing, the suppuration was very abundant and of the same colour, but afterwards changed its appearance, and gradually diminished in quantity. The action of topical simples which were used, was assisted by bitter stomachick drinks. The strength of the patient returned, the ulcer became clean, the walls of the cyst were removed, the liver subsided, the lips of the wound became level, and after six months this cannonier was discharged perfectly cured from the hospital.

The following case removed all doubt on the true seat of hepatick abscesses.

Some celebrated physicians with Bianchi and others, contend that these abscesses are never formed in the proper substance of the liver without causing the death of the individual, in opposition to every plan which can be used to assist nature; and they do not consider these abscesses curable, unless when seated in the membranes which cover this organ, or in the cellular substance which surrounds it.

Besides the reasons given in the course of my memoir, to demonstrate the possibility of curing the abscesses which are formed in the proper substance of the liver, every observation comes in to support these principles

and proves incontestibly that this was the real seat of the hepatick abscesses for which I operated.

Joseph Fath, musician in the corps of grenadiers of the consular guard, after having attended the army of the east through all its campaigns in the capacity of musician to the guides of said army, was attacked before his passage to France, with all the symptoms of chronick hepatitis that did not prevent him from going to Paris. Yet the painful condition, weakness and emaciation to which he was reduced, obliged him to enter the hospital of the guard. M. Sue, the chief physician, prescribed appropriate remedies which relieved him, and he passed several months of convalescence at Paris: but his condition becoming considerably worse, he returned to the hospital on the 6th of October, 1802.

A few days afterwards, I was requested by my colleague to consult with him on the character of this disease.

The emaciation of this patient was extreme; his countenance was heavy and copper-coloured, the eyes hollow and sad, the conjunctiva yellowish, the tongue white, the gums pale, the skin dry and sordid; the right hypochondrium much elevated, and the cartilages of the false ribs strongly curved.

In the intervals between them, was felt a fluctuation, although small and scarcely perceptible. Below the cartilaginous border of the false ribs on the same side, we remarked an oblong tumour which followed the direction of this border, and discovered extensive and deep-seated fluctuation, indicating the presence of accumulated fluids in the substance of the liver, or in some neighbouring part.

The pulse was feeble and slow: the extremities cold, the urine yellowish and copious, and the stools small, inodorous and discoloured; but he had frequent vomit-

ings of decomposed matter, in smell and colour resembling fœces. The patient had no appetite, took but little food, and rejected it soon afterwards; he had continual watching, and uniformly lay on his right side, or on his back; he felt some obtuse pains in the hypochondrium; had frequent syncope, and his respiration was short and laborious: in short, every thing predicted a speedy death.

Notwithstanding the probability of such a fatal termination, we agreed that it was proper to open the abscess, which appeared to exist in the region of the liver. Its presence there I did not even doubt, as I had seen so great a number of similar cases.

I proceeded forthwith on the second of November to open it, in presence of the physician and the pupils of the hospital. I cut the integuments and the muscles, at the most fluctuating part, in an oblique direction, from the origin of the cartilage of the eighth rib downwards, and to the right about two inches; when I came to the last layer of muscles, I distinguished the fluctuation more easily. A small opening made in the external wall of the abscess, immediately gave vent to a jet of liquid pus of a dull grayish colour; by enlarging the incision above and below with a probe-pointed bistoury, I expedited its discharge. I took care not to extend the incision downwards below the adhesions of the cyst, for by that means the pus would have escaped into the abdomen. I computed the quantity which was discharged, at one *litre* and a half.* After introducing my fingers into the cavity of the abscess, I found a deep excavation in the great lobe of the liver, which confirmed the opinion that I had given on the nature and seat of the abscess. The patient, notwithstanding his extreme weakness, and the state of

* About equal to 76 French cubick inches.

marasmus to which he was reduced, bore the operation well, and experienced from it inexpressible improvement. It was dressed methodically; he took some excellent broth, and a few spoonfuls of Burgundy wine, which he digested well; cordial draughts were prescribed for him, and camomile water for his drink, but the state of weakness to which he was reduced by the severity and length of his disease, that had continued since he left Egypt, carried him off. His death was preceded by several hours of a perfect and happy calm.

If this soldier had not so long neglected his disease, and had sooner been operated on, it is probable that he would have recovered.

On opening the body, we found, as we had predicted, a large portion of the principal lobe of the liver deeply ulcerated on its convex surface. From the circumference of this cavity, a membranous substance arose, which formed the walls of the cyst. The inferiour wall extended a little below the border of the false ribs, and was in contact with the transverse colon; the superiour wall had pressed the diaphragm towards the thorax, and had produced an adhesion of this partition with the lungs on the same side; the pylorus was strongly compressed by the posteriour wall of the cyst, which straitened the passage for the food, and produced the vomiting of blackish matter, that took place some days before death.

The loose edge of the liver was of a blueish colour, and scirrhous: the gall-bladder contained but little bile: the viscera of the abdomen were impoverished and reduced to a small volume.

I detached the liver entirely, to preserve it in alcohol. This pathological preparation is deposited in the anatomical museum of the medical school at Paris.

In Egypt, the means of preventing this disease, which most authors have considered fatal, are to avoid by day

the action of the sun, and by night, the contact of the cold moist air; by abstaining from the immoderate use of venery, wine and spirits, by washing the surface of the body with saponaceous water, by taking some bitter infusion in the morning, and acid drinks during the day; finally, by avoiding excessive exercise on foot, and by composing the passions and affections of the mind, which principally act on the biliary organs.

It appears to me difficult to account for the influence which the climate of Egypt has, in conjunction with very slight local causes, in producing the gradual and almost insensible destruction of the principal organs of generation. I shall content myself with an exposition of these effects and their phenomena, in the following account,

Of the Atrophy of the Testes.

Many soldiers of the army of Egypt, at their return from the campaigns of 1799, complained that their testes had almost entirely disappeared, without any venereal disease. Being surprized with this phenomenon, of which I had seen no precedent. I was anxious to become acquainted with the cause, and the progress of this singular disease. I shall here detail the symptoms as I observed them.

The testes lose their sensibility, become soft, diminish gradually in size, and appear to dry. In general the change begins by one of these symptoms.

The patient is not aware of this destruction, which is produced insensibly, until the testis is reduced to a small size. It approaches the ring, having the size and shape of a white French bean. It is indolent, of a hard consistence, and the spermatick cord is diminished, and partakes of the atrophy.

When both testes are affected with atrophy, the man is deprived of the faculty of generation; an absence of all amorous desires and sensations, with general laxity of the organs of generation ensues. Indeed all who have had this disease, have since felt no desire for venery, and this loss influenced all the organs of internal life. The inferiour extremities became lean, and tottered in walking; the countenance was discoloured, the beard grew thin, the stomach lost its energy, digestion became difficult, and painful, and the intellectual faculties failed.—Many soldiers, in consequence of these infirmities, were considered as unlimited invalids.

I attributed this disease principally to the intense heat of the climate of Egypt, which by softening the testes disposed it to decomposition. The more fluid parts of this organ are drawn out by perspiration, another portion is absorbed by the lymphatick system, and carried into the circulation. The parenchyma of the vessels which resists these first effects, is weakened and retracted; the tubes become dry and obliterated: the whole substance of the testis loses more or less of its volume, and withers.

To this principal cause may be added, the fatigues and privations of war, and especially the use of brandy of dates, to which the natives of the country add the fruits of several species of solanum, the pseudo capsicum, and the capsicum, which are a species of pimento, in order to augment its strength and improve its taste.

Perhaps, also, experience or tradition has taught the natives that these substances moderate nervous sensibility and mobility, which are greater in hot climates.

Physiology teaches us that there is a great sympathy between the stomach and testes; for an irritation of these latter organs often produces a spasmodick action of the stomach, followed by pain, anxiety, and vomiting. In

like manner the affections of this viscus deprive the testes of their energy and soundness; now it is possible that these species of solanum may have indirectly a benumbing effect on the testes. The ancients produced an atrophy of them by the long-continued application of the inspissated juice of hemlock to the scrotum.*

I have remarked that the juice of *bella donna* instantly paralyzes the very organ of sight; of this fact I am satisfied from many examples. Solanum should then be used in hot countries with great caution, as I am persuaded that it is pernicious.

When the atrophy of the testes is complete, art offers no relief; but when it is commencing, its consequences may be obviated by means of vapour-baths, dry frictions of the surface of the body, the application of nettles to the nates, cooling medicines, stomachicks and good diet.

This disease may be guarded against by avoiding the use of spirituous liquors, especially the brandy of dates made by the Egyptians, and on this account the use of the confections of this liquor should be admitted with particular caution. A suspensory bandage should also be worn, moderately tight; frequent washing of the whole body with fresh water and with vinegar, should be practised, and excessive venery avoided.†

*See Marcellus empiricus, *experientia*, 33.

† Since my return to France, I have seen and prescribed for this disease in many of the soldiers of the imperial guard. It was similar to that which appeared in Egypt, and as we were informed by the soldiers themselves, arose from the same cause, viz. the immoderate use of ardent liquors, and excess of venery.

In one case this disease reached its acme in a short time, and both testes almost totally disappeared. The patient had at this time a very robust constitution, and a very strong and well-set beard: he lost these marks of his virility, and after this, had the appearance of an effeminate being; his beard became thin, his voice extremely feeble and sharp, his genitals were without action and generative power: no

SECTION VI.

The surrender of Cairo secured to us, a second time, the conquest of all Egypt, except Said, which the commander in chief was bound to leave to Mourad Bey for an annual contribution.

A heavy contribution was imposed on the inhabitants of Cairo, which furnished the means of paying the arrears of the soldiers, and refitting every department of the army. Our hospitals, before in a bad condition, were improved, and every means adopted, which circumstances admitted of, to diminish the causes of the contagious diseases which this last campaign had increased.

Every thing promised a long repose, and under this expectation, I recommenced my course of surgery and anatomy. The clinical lectures always afforded us new subjects of instruction.

Many of our soldiers had contracted the leprosy during the siege of Cairo, by lying on mattresses that had been used by the inhabitants who had this disease: salt provisions also produced it. I studied the phenomena, and watched attentively the progress of this disease in our men. I also found many of the people of this country affected with elephantiasis, and as authors con found these two diseases, I diligently compared their symptoms, and observed their difference.

means which we used could arrest the progress of this disease, and he was discharged.

It will be seen in the course of this work, that the same disease was produced by deep wounds of the neck, with injury of the inferiour processes of the occiput.

Of the Leprosy and Elephantiasis.

Physicians who have written on the leprosy and elephantiasis, viz. Hippocrates, Galen, Aretius, Archigenes, Aetius, Soranus, and Oribasis, do not agree as to the proper characters of these diseases, and their distinctions.

As I only intend to give a precise account of these diseases, as they were presented to me in Egypt, I shall not leave the subject to detail the opinions of these authors. I shall say nothing of some diseases that are found in Europe, or other countries distant from Egypt, which also have characters similar to the leprosy and elephantiasis: for from the observations that I have made, I consider these as diseases proper to warm climates, and in particular to Egypt. At least, I believe, that if they be transplanted into other countries, they degenerate, and assume a different character.

Experience has also taught me, that leprosy differs essentially from elephantiasis; although these diseases have some symptoms in common: agreeably to this opinion, I shall give a separate account of each.

Of the Leprosy.

The Egyptian leprosy only attacks the external covering of the body, and especially the epidermis: its attack is indicated by flying pains of the limbs, by difficulty in walking, and by general lassitude and weakness. The patient falls into a deep melancholy. In a short time small blueish pustules appear, rugous at the summits, and united in patches more or less extensive; they in general make their appearance on the face and extremities, rarely on the chest or abdomen: the nates and knee-

joints are most affected. These pustules dry on the surface, and form blackish crusts, from beneath which a serous and yellowish humour is discharged, of a fetid smell; the breath of the patient is equally offensive, the pulse feeble, and the urine copious and earthy: to these symptoms are added, when the disease has made considerable progress, a slight dyspnœa. The countenance becomes in colour like bronze, the skin of the surface of the body becomes unequal, rugose, and unfit for perspiration; it loses its sensibility where the eruptions, of which we have spoken, appear. The lips thicken, and the nostrils dilate and flatten the nose, and the nasal mucus becomes fluid and ichorous; the tears are acrid, and ulcerate the loose edges of the eye-lids, and often flow over the cheeks. The subject evidently becomes emaciated. The pustulous eruptions augment progressively, and become more black; sometimes they extend to a distance and unite. These leprous scabs cause no pruritus like herpes, to which they bear some resemblance; there is pain in the articulations and in the bones. The patient may remain whole years in this condition, or die in a short time. In the latter case, the small ulcers concealed by these pustules or leprous scabs become larger, attack the cellular membrane, which in the parts corresponding with the scabs, becomes tuberculous, and like lard. The portions of skin affected, acquire an increase of thickness, and totally lose their sensibility; so that portions of the epidermis gangrene, and may be cut off without pain. Hectick fever ensues; the patient falls into a marasmus, and gradually wastes away. Sometimes the ulcers attack the articulations of the joints, so deep as to destroy their ligaments, and thus produce necrosis, and the loss of the limb.

At Grand Cairo, I saw many lepers who secluded themselves from society; they had all the symptoms

that have been enumerated. Several soldiers of our army took the disease from the causes, no doubt, which produce it among the Egyptians. Its symptoms were similar in these two classes of persons, with the exception of some difference in the seat of the pustules, their extent and their character; but as to colour and shape they were uniformly the same. The general affection is more or less severe, according to the idiosyncrasies of the subject, and many other particular circumstances.

This disease to me appeared contagious, when the ulcers were deep and extensive, and when the subject was reduced in strength. In this case a fœtid and nauseous odour arises from the ulcers, and the whole surface of the body. It was impossible to inhale this odour for a few minutes without inconvenience. The linen and apparel worn by lepers, appeared to be impregnated with a deleterious substance, suitable to the production of the same in those who might wear these clothes, and be predisposed to absorb it. A knowledge of these facts, and the advice which the ancient Arabian physicians give to isolate lepers, induced me to assign a separate apartment to our soldiers who were thus affected. Still circumstances did not always allow me to make this isolation complete, and I saw it contracted by persons who had more or less intercourse with them. During the siege of Alexandria, while attending an officer of the 25th demi-brigade for a well-marked leprosy, which had confined him six months to the hospital, I remarked that another officer who was far removed, although in the same ward, was affected some time after with the same disease: but he also had frequent communications with the leper. It became complicated with a wound that was almost cicatrized, the consequence of the amputation of his left arm. The cicatrix then became covered with a thick yellow crust, furrowed with deep cracks, from which issued a

fetid and ichorous humour. The circumference of the stump assumed a blueish colour, and became insensible: the remainder of the limb swelled and hardened, and the skin partook of this blueish tinge. Leprous pustules then appeared in different parts of the body; chiefly on the wrists, legs and face. The least motion produced acute pains in the extremities; his figure became hideous, and his skin dry and rugose. He ate but little, and had a depraved taste: his strength diminished, extreme leanness succeeded, and he died, after having spent the last days of his life in a horrible state of inquietude, pain, and a kind of anxiety difficult to describe. This officer, by his own confession, never had had the venereal disease in any form, nor any herpetick eruption; his regimen had been much better than that of the soldiers. The wound of the stump had been disordered by no accident, until the cicatrix was nearly completed, when the leprosy showed itself. Hence I am led to believe, that it is communicated by contagion alone.

The sudden attack of this disease which an infantry guard, (Charles Fourrat) experienced, as I shall hereafter detail, appeared to me an undeniable proof of the effects of this contagion. To these facts I may add the opinion of a greater part of the ancient Jewish and Arabian physicians, and those of Egypt at the present day.

I have never seen the leprosy complicated with elephantiasis, which, as I have already said, I believe to be a distinct disease. On opening the body of the officer, above spoken of, I found the liver hard, more voluminous than in a healthy state, and of a deep brown colour: the gall-bladder contained a small quantity of thick bile of a bottle-green colour: the spleen was apparently scirrhous, and larger than natural: the other viscera of the abdomen were considerably discoloured and relaxed: the mesenterick glands obstructed: the small intestines spot-

ted with hard tubercles in colour resembling red chalk: there was scarcely any cellular substance; that remaining was yellowish, and filled with whitish hard tubercles and ulcers, and the skin was as stiff as parchment, and inelastick.

Chronick venereal diseases or herpetick affections appear to be predisposing causes of leprosy. Some of our soldiers, after having been subjected to several anti-venereal courses for obstinate cutaneous pustules and syphilitick symptoms, which to all appearance had been cured, were afterwards attacked by well-marked leprous eruptions which yielded to the treatment described below.

We may also consider the use of salted meats and salted fish and onions, a large quantity of which the people of this country consume, as secondary causes of this disease; also the meat of the hog, or even wild boar without salt, for we found that all the French who fed on them for some time were disordered. A great number were attacked by leprous eruptions on the face and especially on the nose, that rendered their appearance hideous; the superiour and inferiour extremities then became affected, and subsequently the whole surface of the body. No doubt that the flesh of these hogs that are fed differently from those of Europe, contains some unwholesome principle; for when exposed to the great heat of the climate of Egypt, it becomes immediately decomposed. Without indulging in other conjectures, it is a fact that this meat is unwholesome, and it was probably from a knowledge of this that the lawgiver of the Jews, and of the mussulmans, have forbidden its use.* To this cause we may add the want of cleanliness among the Egyptians: an impression in some degree poisonous, to which the lower classes are subjected, from various extraneous

* See Genesis and the Koran.

bodies, while sleeping almost naked on the earth during the summer; and finally the inclemency of the season, which acts with more or less force on these individuals: on the other hand, the rich who keep themselves very clean, and can avoid these vicissitudes, are exempt from the leprosy. They seldom take it by contagion, because they use many precautions to guard against it.

I saw no one die of the leprosy, except the officer of whom I have spoken: but I believe with Areteus and Avicenna, that the leprosy is very dangerous, if not mortal, when it becomes violent It is always very injurious and inveterate, and requires the greatest care, and a protracted plan of treatment.

The treatment of the leprosy has been varied by almost every physician who has engaged in it.

Experience taught us that the preparations of mercury prescribed by some, exasperated the symptoms even in cases of a syphilitick character, and sometimes pre-disposed to the leprosy. So true it is, that a chronick disease absolutely changes its nature, and often cannot be cured but by remedies different from those which are regarded as specificks in the same disease, when acute: indeed, we have cured a great number of old venereal cases by the use only of bitters, chinchona, opium, champhor, and other tonicks. The leprosy which I consider as an asthenick disease of a particular kind, requires a similar treatment.

In order to point out this treatment methodically, I have considered the leprosy under four different stages. In the first stage there is a humoural turgescence, and the eruption begins. In the second this is complete, and the strength fails. In the third, the pustules are covered with blackish yellow crusts, and the diseased parts are deprived of their sensibility. In the fourth, these crusts fall off, and disclose fungous ulcers of a violet red, with

excessive smarting, and the discharge of a fetid and yellowish sanies. There is prostration of strength, marasmus, hectick fever, and sometimes colliquative diarrhœa.

In the first stage, leeches to the margin of the anus when there is obstruction in the venous system of the abdomen, produce a salutary evacuation. In Egypt as a substitute for leeches, which we could not procure, we used dry scarifications to this part, and to the hypochondria. This plan, of which I have a high opinion, is preferable to common venæsection which is generally injurious in warm climates, and in Egypt especially, in the treatment of the leprosy.

A shock given to the stomach by a gentle vomit, facili tates the action of other remedies. To this may succeed mild purgatives. The patient is then put on the use of tepid baths, of emollient enemata; of bitter and mucilaginous drinks, such as whey boiled with fumitory, and an infusion of the various bitters during the day, and a camphorated antispasmodick potion at night. The regimen should be mild and diluting, composed principally of spoon-meat and vegetables. Such are the remedies proper in the first stage: by their use we arrested the progress of this disease in many of our soldiers who had been attacked by it. We applied on the eruptions a little mild salve, such as the safron coloured cerate.

In the second stage, the mucilaginous drinks should be omitted, and the bitters should be exhibited stronger, with the addition of the roots of the *lapathum hortense* and burdock. The red sulphuret of antimony, combined with the extract of fumitory and the muriate of ammonia, and pills of camphor and opium, given at night in small doses produced the best effects. When we did not see the patient until the second stage had come on, the remedies were preceded by some light pur-

gatives, and two or three warm bathings, to soften the skin and the pustules: more frequent bathing would diminish or prevent the effect of the medicines. The use of the salve before mentioned, should be continued.

In the third and fourth stages, to the remedies already enumerated, should be added the diaphoretick syrup in the composition of which the five aperient roots enter; and the dose of it should be gradually augmented as well as the opium and camphor. The regimen should be stomachick and stimulant. The patient should use good wine in small quantities, sweetened Mocha coffee, should abstain from all indigestible food, and use but little salt with his aliment. He should breathe the purest air and take moderate exercise: finally, he should often wash the surface of the body with vinegar and warm water, and fumigate his bed and room with strong vinegar.

This treatment, with proper modifications, should be continued a sufficient time to derive advantage from it.

When the general taint is removed, or weakened, as will be known by the improvement of the symptoms, the leprous crusts may be taken off with the scissors or bistoury, if nature has not removed them: even the disorganized skin may be cut or removed altogether. This will be productive of no pain, and is attended with a slight effusion of dark blood. The actual cautery to be immediately applied to the ulcers which follow, and repeated each succeeding day, until the subjacent parts shall regain the life and tone which they had lost.

The strength and functions of the patient improve daily; he gains flesh, the ulcers clean and heal. We have remarked that the cicatrices remain blue and become painful, when the atmosphere is moist; alkaline lotions should be then used to strengthen them. At the same time, pains in the limbs are felt. These light infirmities excepted,

this treatment when long continued, produced a complete cure in every case of leprosy, except the officer who had his arm amputated.

The daily dressings were made with a solution of oxid of copper, allum, and a little sulphurick acid.

The treatment which I now detail has perfectly succeeded in many cases of leprosy, and remarkably in one which shall be noticed.

These observations seem to leave no doubt as to the true character of the leprosy, the symptoms of which were recognized by us in the hospital of the imperial guard, and also by many physicians. They also tend to confirm the opinion of the contagious nature of this disease.

Charles Fourrat, a foot guide of the army of the east, of a robust constitution, having never had the venereal disease, about the latter end of the year 1801, during the siege of Cairo, was attacked by an eruption of pustules on different parts of the body. He knew not to what cause to attribute it: he was sober, and his diet had never been unwholesome; but he recollected having laid several nights on a mattress taken from the house of an inhabitant in the suburbs of Cairo, where he had seen a woman, the surface of whose body was covered with blackish crusts and who appeared to be very ill. He had reason to believe that she had constantly used this mattress, which being impregnated with this leprous contagion, had communicated it to him. These pustules at first distinct and separate, although in groupes, soon united and formed ulcers of various extent, and of a blackish colour covered with thick crusts of a yellowish brown; they were divided by deep cracks which discharged a very fetid and ichorous humour.

At first the patient, according to his report to me, felt a smarting in the pustules which were red, rugose at their

summits, and surrounded with a blueish disk: he had wandering pains in all his limbs, and in the hypochondria general debility, lassitude and nausea. He was carried to the hospital in the fortress of Ibrahym Bey, near Cairo. His pustules were considered as syphilitick, although he protested that he had never been exposed to venereal infection. Mercurial frictions, and other antisyphilitick remedies were prescribed, but their bad effects were soon apparent. The general pain became severe: the pustules puffed up and were extremely painful, and the irritation so great, that he could not enjoy a moment's repose. He was entirely deprived of sleep, and experienced continual pains that were alleviated only by antispasmodicks, tepid baths, and by soothing medicines. After continuing this plan for some time, he left the hospital without being cured; his pustules were more extensive, and still covered with crusts, while his body was much debilitated, and reduced in size. Other remedies were afterwards prescribed which did not prevent the disease from advancing.

This soldier having left Cairo with his division for France, was left at Malta, with many other sick. From the bad state of his pustules, and their hideous and blackish appearance, the committee of health of this island were led to believe, that Charles Fourrat had the plague. Indeed when I first saw these pustules, at the hospital of the guards, they bore some similarity to the carbuncles of the plague. He underwent a quarantine at Malta, and soon after was sent to the lazaretto at Marseilles, where he remained nearly two months. In the mean time it became known that his disease was not the plague; he arrived at Paris, March 22d, 1802, and was admitted in the hospital of the guard.

He was weak and emaciated; his body was of a copper colour, his eyes dull and heavy, his lips thick and

blueish, and gums pale; his nose, formerly straight and thin, was now sunken; his breath fetid, his skin and face wrinkled, and respiration slightly laborious. His thorax and abdomen were in a natural state, but his extremities lank and benumbed. He ate but little, had a depraved taste, felt lassitude and pains in the limbs and hypochondria; his pulse was weak, and without fever.

His elbows and knees were covered with thick blackish scabs, which concealed fungous and sanious ulcers. The edges, formed by the integuments, were detached from the ulcer, and thin and insensible; this insensibility extended to a considerable distance. The patient felt a slight smarting towards the bottom of these ulcers; similar tumours were seen on the buttocks and on the right thigh; the digestive functions were well performed; he slept none, or had unpleasant dreams, and was continually in a state of melancholy.

M. Boussenard, who had the surgical charge of the division from Cairo, gave me the details introduced above, from which it may easily be seen that this guide was in the third stage of the disease when he entered the hospital of the guards.

After having prepared the patient by some light purgatives, I put him on a bitter diaphoretick ptisan, with wine and bark in the morning, in large doses; the syrup above mentioned, in the evening, and a bolus of camphor and opium at night.

These prescriptions were alternated with some sulphurous and antimonial preparations. By the use of emollients I detached the crusts that covered the ulcers, and for the first days dressed the sores with anodyne ointment. His regimen was mild and nourishing; he used a little Burgundy wine, and during the day walked with crutches.

By continuing this treatment, with suitable variations, for two months, his pains abated, the smarting which was experienced towards the bottom of the tumours ceased, his strength returned, the ulcers became clean, but the surrounding skin remained in the same condition, and I was obliged to cut off all that was disorganized.—This operation was performed without pain; there was only a slight effusion of dark oily blood. I then used the actual cautery, and repeated its application several times; no pain was felt except from its last applications. I then used lotions of hot wine, and of such fluids as were indicated. On the second application of the cautery, the flesh became red and sensible, the obstruction of the cellular texture was removed, and the surrounding skin resumed its elasticity and sensibility. By degrees a cicatrix was formed, and the patient was discharged completely restored, on the 4th of July, from the hospital.

The features of his face resumed their primitive shape, and he became corpulent: but the scars, which were large, retained a blueish appearance, and caused painful twitchings when there was a change of weather.

This soldier, who served some time among the chasseurs of the guards, afterwards retired to Briançon, his native country, with a pension.*

* Dr. Alibert has an abstract from this case in his description of the diseases of the skin. To this important and justly-celebrated work we shall refer those who wish to have more extensive opinions on the character and varieties of leprosy: I did not intend to treat of this disease, *ex professo*, and have only spoken of its singular phenomena as presented to us in Egypt.

The Arabian authors that I have examined since the first impression of this memoir, advise nearly the same remedies as were used in the cases that we have just reported. Internally, bitters mixed with antiscorbuticks, and antimonial preparations, modified according to the different degrees of the disease. Externally, oleaginous anodyne liniments; then by degrees, topical applications of greater activity,

Of the Elephantiasis.

Elephantiasis appears to be a disease of the lymphaticks; it attacks the skin and the cellular texture of the inferiour extremities, which become of such immense size, and so deformed, as to be compared to the feet of the elephant.* Hence, according to authors, we have the word elephantiasis (see Avicenna.) This disease differs in many respects from the leprosy, although, like the latter, it commences by general lassitude, debility of the inferiour extremities, and difficulty of motion in these parts.

The soles of the feet are very sensible; and on the the least loco-motion, the patient feels pains of the bones, nausea and distress; the face is discoloured, the lips thicken, and the gums become pale.

The feet and legs are enlarged by an obstruction of the membranes of the cellular substance, and of the skin. The leg and foot is covered with distinct tumours, like small military buttons, of a reddish violet colour. These ulcerate, and the ulcers and fissures are covered with black, thick, and irregular crusts. The humour which is

escharoticks and the actual cautery which these physicians applied, not only on the eruptions, but even on other parts of the body, as the head, back, and extremities.*

It was probably by the proper exhibition of these remedies, that Dr. Poncet, a French physician at Cairo, had the good fortune to cure *Grand Negus*, the emperour of Ethiopia, who had a very inveterate leprosy: a similar cure which this physician had made on the person of a celebrated merchant of the same city, had gained the confidence of that monarch, who sent for him. For this success, says a French historian, (one of my ancestors*) Dr. Poncet received a reward worthy of the liberality of one of the richest sovereigns on earth.

* See the history of France during the reign of Louis XIV, by Dr. Larrey, 12mo. vol. vii. p. 151.

* See the plate of a man afflicted with sarcocele.

discharged from these chaps or ulcers, is similar to that from leprous pustules. The skin of the leg becomes marbled from the number of small varicose veins which enlarge in its substance. These extremities lose their sensibility, gradually increase in size, and in proportion to their increase become hard; for in pressing them we find a resistance: the print of the finger does not remain as in œdema, which differs from elephantiasis again by its diminution of heat and retention of sensibility, as we know by the acute pains of which the patient complains. In elephantiasis, the heat, far from decreasing, increases, according to the progress of the disease, until it becomes very unpleasant.

This appearance has led me to believe that the adipose substance predominates in the tumefied parts, which appear to acquire a greater consistence from the addition of hydrogen, that I suspect is formed in the venous system in consequence of its want of elasticity, and the slowness of the circulation.

The external ulcers extend in breadth, and but little in depth: the skin of the feet and legs acquires a considerable thickness; the nails are disorganized and converted into yellowish scales: the cellular texture thickens and becomes as hard as lard, that between the interstices of the muscles undergoes the same change, compresses the moving fibre, weakens its power, and almost suspends its contraction; motion and sensibility are gradually extinguished, and when the disease is at an advanced stage, the feet and legs are heavy, almost paralytick, and resemble masses of matter without shape. The patient is obliged to keep in one place, the body becomes emaciated, the face tawny, the lips thick, and commonly cracked, and the breath fetid as in the leprosy. Pustules of a herpetick appearance arise on the scrotum and sides of the thighs. The features of the face, with the exception of

the lips, are not altered; the eyes are even bright and lively, the skin of the back becomes white and shining when rubbed, but it does not scale off as in the leprosy: the hair retains its length and colour; the beard, instead of falling out as in the leprosy, thickens on the chin, and the pulse remains natural. The elephantiasis does not destroy the appetite, is not contagious, but may be hereditary: according to Bruce, it never appears until manhood, or some time after. The natural functions are not always even disordered, and the subject may live with this disorder to extreme old age. In this it differs from leprosy, for although the latter is of long duration, it gradually increases, and almost always has a fatal termination.

The glandular disease of Barbadoes bears some analogy to the elephantiasis, although it has symptoms which are not observed in the latter affection, as the inflammation along the course of the lymphaticks, which attends the attack of the disease, and fever through every stage of it. The tumour has not the same appearance as in elephantiasis, in which the skin is rugose, and covered about the articulations with blackish tubercles, intersected by sanious and fetid ulcers.

There appears also to be a considerable similarity in the origin of these two affections, and in their results.—They may be of the same species, but climate, and a diversity of causes, produce a difference, and these differences are not perhaps so distinct as to be considered essential, and to point out the line of demarkation between these two diseases. In order to do this, a physician should make his observations in one climate, and be able to transport himself into all others, where, in individuals who are attacked by disease, particular causes produce different phenomena.

It is probable that elephantiasis attacks the whole system: but from particular causes which we shall attempt to explain, it acts principally on the legs, where it appears to settle and become local, like the taint of scrofula, which having produced a deep ulcer in one extremity, often becomes entirely concentrated there, and forms a local disease, that must be removed by amputation.

The cultivators of rice, and they who inhabit marshy situations, are most obnoxious to this disease.

The pre disposing causes of elephantiasis, are nearly similar to those of leprosy. To these may be added the immediate and continued action of moist air, or stagnant water on the feet and legs, such as the waters of rice-plantations, which are very unwholesome on account of the great decomposition of vegetable and animal substances, which is constantly going on in them. They seem to relax the texture of the skin, and afterwards, to tumify and disorganize it.

At Damietta, I saw a great number of agriculturists who had this disease in its various stages, but it is seldom seen in dry airy situations, and on the borders of the desert and Upper Egypt, but according to Bruce, it is found in the marshy countries of Abyssinia. The leprosy, on the contrary, prevails in the desert regions of Egypt, and I have never seen it on the sea-coast where the elephantiasis is common.

The elephantiasis may be found in three different stages:

In the first stage, the feet and legs are slightly swollen, of diminished sensibility, covered with a miliary eruption, of a reddish brown colour, with slight painful pricking, increase of heat, irregular pains, especially in the soles of the feet. If the skin be pressed, the patient suffers pain, and the impression does not remain as in œdema. There is also a difficulty of motion.

In the second stage, the eruption is succeeded by small ulcers covered with thick yellow, and tuberculous crusts. The skin is intersected by varicose veins which give it a marbled appearance. The heat is more considerable, as well as the difficulty of motion: the limbs increase in thickness, and the sensibility is further diminished.

In the third stage, we find a hardness, and augmentation of size of the extremities; more extensive ulcers, and tuberculous black scabs: a total failure of loco-motive power, loss of sensibility, general debility, emaciation, and melancholy. Although the persons who have this disease generally survive it, the prognosis is by no means favourable. It renders life a burthen, and when it has arrived at this stage, admits of no remedy.

Unlike the leprosy, it does not appear to be contagious; none of our soldiers were attacked by it. I consider it as endemick in warm climates, for I have seen it with some varities, in different countries of Europe.

The means of cure are nearly similar to those pointed out for the leprosy. Yet, we should depend more on topical remedies, viz. discutients, repercutients, causticks, and especially the application of fire, and graduated compression.

By these means I cured a captain, thirty-eight years of age, who had an incipient elephantiasis. An opportunity has never been given me, to undertake the cure of this disease when it had reached the second or third stage. But I still think, that if it were confined to one of the feet, and had resisted a well-directed course of treatment, as above detailed, we might, as in chronick scrofulous ulcers of the articulation of the tibia and tarsus, remove it by amputation of the limb.*

* The putative disease which the Lamberts, two young Englishmen had, whom we saw in Paris at the Palais-Royal, bore no resemblance to that of which we have been

SECTION VII.

A short time after the surrender of Cairo, a Turkish fleet of twenty-six sail appeared before Alexandria, as if with an intention of making a debarkation. The commander in chief being informed of this, repaired to Rahhmanieh, and there waited the return of a courier who had been despatched to Alexandria. The fleet having retired, and the city being no longer threatened,

speaking, with the exception of the face, palms of the hands, and soles of the feet, and a stratum of horny scales of different shapes and sizes, which grew again after having been cut off. I examined these two persons with much attention, and was convinced that their appearance was owing to original conformation, which their father also possessed from nature. He was taken by the English on the coast of Mexico, and, as I was informed, by the conductor of his children, had never been able to speak the English language so as to give an account of his native place, the nature of its soil and climate, or its inhabitants; or to tell what related to himself. They only knew that after this Indian had quitted the immense thorny forests of the lower part of South America, from curiosity, or some other particular motive, he directed his steps towards the sea-shore, where the English found him, and thence transported him to their own country: he there married an English woman, by whom he had children of both sexes. The boys inherited the deformity of their father, and transmitted it to their male descendants: but the females had no vestige of these horny excrescences, and in their conformation resembled their mother.

During a campaign of the grand army, I saw at Vienna, in the anatomical museum of the university, the body of a little girl, which, like these men, was covered with horny productions: it was embalmed by the celebrated Barthe. This anatomist has proved by dissection and by injections, which he has pushed farther than Ruysch, that these productions are organized, as the hair and nails, and therefore cannot be a disease.

the general with his etat-major returned to Cairo, after having formed a camp of observation at Rahhmanieh. We established a hospital here, and I attached a *flying ambulance* to these troops.

The general before his departure, directed me in the order of the day, to repair to Alexandria; to examine the surgeons of the army, that they might receive promotion as their talents, services, and zeal merited. I set out with generals Longi, Sanson, and the intendant and commissary general Daure, who was going to inspect the fortresses on the sea coast.

We took the road to Alexandria, and in two days crossed the scorching deserts which border on the dry lake Mareotis. About the middle of our journey, the *samiel*, or wind of the desert, rushed upon us; almost at the same moment we were enveloped in whirlwinds of dust, that obliged us to stop and to lie on the sand against our horses, to avoid the direct action of this wind, and the suffocation which is caused by it: still we suffered so much, that with difficulty we reached a place of rest, but a short distance thence.

This was the second time that I experienced the effects of this species of *khampsyn*. Four of our soldiers were dangerously affected by it, and many of the cattle in the caravan died from it.

On my arrival at Alexandria, I attended to the business of my mission: and then went to Rosetta, where I visited also the hospitals and *lazarettos*, and examined the surgeons of the corps which constituted the garrison.

As we were setting out for Damietta, we received information of the death of general Kleber.

Solyman El Haleby, a well-informed but fanatical young philistine, having formed a resolution to assassinate the commander in chief of the French army, set out from the camp of the grand-vizier, who remained in

Syria, to put his execrable project into execution: he soon found an opportunity. According to the report of M. Casabianca, who had succeeded me at Cairo, the first wound which this villain gave the general with a poniard, penetrated the thorax obliquely, from the right hypochondrium to the right auricle of the heart, and pierced this organ to the depth of some lines. A short time afterwards, being desired to embalm the heart of the general, I found an irregular wound in the anteriour wall of the auricle. He also wounded Protin, an officer of talents, who went to assist Kleber.

Haleby could not escape: he was seized and condemned by a special tribunal, to die by a punishment which is usual for such crimes. The fortitude and composure with which he bore the burning of his right hand, and subsequent empalement, must astonish a man of feeling, and proves how far the resolution of an individual can control his natural sensations. He survived about four hours in the greatest torment, without uttering a groan. His hand was burned to the bone; and the stake after lacerating the viscera of the abdomen, and the nerves and vessels, had fractured the bones of the sacrum, two lumbar vertebræ, and fixed itself in the vertebral canal. I knew this by the examination of his body sometime afterwards, although it had been dried. I deposited his skeleton in the museum of natural history!

General Desaix, the brave companion of Kleber, who had returned to France, was killed the same day and hour, June 14th, 1800, in the memorable battle of Marengo. The particular friendship with which Desaix honoured me while in the army of the Rhine, and during the journeys which we made together in Italy, while visiting the fields where Bonaparte had been victorious, and during the campaigns of Egypt, made me more sensible of the loss of this great man.

From Rosetta we hastened to return to Cairo, where we found general Menou in the chief command of the army. On succeeding general Kleber, he issued a proclamation, in which he announced the occurrences that had taken place. He soon adopted many useful regulations. He reformed the executive department, gave orders for the organization of the hospitals and *flying ambulances*, rewarded the courage and zeal of all the health-officers by an increase of pay, issued several important commissions, established a privy council, to which were admitted the physician and surgeon general, and placed Mr. Boudet at the head of the pharmaceutical department, who fulfilled its duties with distinction and integrity.

The army now enjoyed an uncommon degree of comfort and tranquillity; it was clothed and equipped anew. The barracks were wholesome and well arranged; a variety of manufactures were in a state of activity, and the soldiers had every thing necessary and comfortable.

During this period of repose, we became acquainted with the advantages and disadvantages of the climate of Egypt, and then only did we enjoy any pleasure.

On the 27th of July, I went to Damietta, to finish the examination of the surgeons of that corps, and the inspection of the surgical department of the hospitals and the lazaretto at that place.

I halted a short time at Mansoure, a place remarkable for the unsuccessful battle which St. Louis there fought with the Saracens During my stay at Damietta, I discovered in the surrounding rice-plantations, the principal causes of their endemick and pestilential diseases. I passed over a great part of the lake Menzaleh, which has attracted the attention of all naturalists on account of the number of fowl which covers it after the inundation of the river.

General Andreossi, a member of the institute of Egypt, has given an excellent memoir on the topography of this lake, and the ruins of the ancient cities which surround it.*

On my return to Cairo, I made a report to the general board of publick health on the state of the hospitals at Alexandria, Rosetta, and Damietta, and on the improvements of which they were susceptible; and to general Menou I gave an account of the result of my operations with those of the surgeons of these corps, and the hospitals of these three places. I resumed my course of lectures,† and attended anew to the organization of the *flying ambulances*, in order to be prepared in case of an unexpected march.

The whole army being now well supplied with provisions, &c. enjoyed good health. The itch, gout, and many other diseases common in France, had entirely disappeared in this climate: but the free intercourse which the women of the country kept up with our men, spread the syphilis, and in a short time a number of cases were admitted into the hospital. It was no easy task to arrest this contagion among soldiers, who being seasoned to this climate, and previously deprived of the company of women, had regained all their health and vigour. To remedy this inconvenience, and to prevent the propagation of the syphilis, I proposed to the general to establish a a civil hospital to receive prostitutes who had the venereal disease, with those of the same description who were pregnant, in order to prevent intentional abortions, which they generally brought about, and to save the lives of their

* See the great work on Egypt.

† At the conclusion of my course, I gave a prize-medal, and recommended the gentlemen to the commander in chief, for promotion, who had distinguished themselves during the campaigns, or at the different examinations that had been held.

children. General Belliard, commandant of Cairo, in consequence of an order from the commander in chief, immediately prepared a large well-situated house, where all the women were collected, without distinction, who were suspected of having had intercourse with the French soldiers. They who were not infected were dismissed, and the rest were retained, and treated with the greatest attention.* Strict search was also made through the barracks, and every venereal case was sent to the hospital, where they were confined until cured. These measures had the desired effect, and the patients of both sexes were restored to health.

I remarked that the syphilis in Egypt is very mild and easily cured; but if transplanted to Europe, or the countries of the west, it becomes very obstinate and difficult to manage; I saw examples of this in many soldiers who carried the Egyptian syphilis to France, and with great difficulty were cured, after a long time. The treatment of this disease, which, with us, succeeded best in Egypt, consisted of mercurial preparations given internally, with tonicks and diaphoreticks—the vapour-baths also assisted these remedies. Mercurial frictions were injurious; they did not cure the disease, and in some cases caused phrenitis, and in others violent spasms and ptyalisms, which it was difficult to check.†

Into this civil hospital, which did honour to the humanity of Belliard, we received the inhabitants who laboured under acute diseases, to inspire them with confidence in the

* I gave the surgical care of this hospital to Mr. Casabianca, surgeon general adjunct.

† In a memoir that I intend to publish, on venereal diseases, I shall state the advantages which I derived in many cases of occult syphilis, such as we had in Egypt, and in the hospital of the guard, by inoculating with the gonorrhœa. On this subject the excellent work of Dr. Swediaur on syphilis may be consulted.

healing art; but we had much trouble in overcoming the fatal prejudice that induced them to abandon themselves to the unassisted resources of nature, and to persuade them to renounce the custom which prevailed, of dragging on a miserable and painful existence in the streets and highways, for the probable means of cure.—Among the sick and invalid inhabitants of both sexes that we received into this hospital, were two very remarkable, who were affected with enormous sarcoceles. I had proposed operating at a certain time, but just then, by an unforeseen event, the whole army was obliged to march.

This disease, which had already appeared among our soldiers, is very common in Egypt, and also in the countries of Asia and Africa, if we may credit the report of travellers.

Of the Sarcocele.

Fabricius ab Aquapendente, Hildanus, Andre Delacroix, Lanfranc, Gabriel Fallopius, and many other physicians have described this disease under the name of "*caro adnata ad testes vel ad testem, etc.*" Since these authors, who appear to have seen the sarcocele in warm climates, the moderns have confounded it with the diseases of the testes; as tumefaction, inflammation, scirrhus, cancer, hydrocele, and hydrosarcocele.

The etymology of the word sarcocele, and the meaning which authors have attached to it, prove that it belongs exclusively to this disease, which distends the external coverings of the testes to an unusual degree, and especially the scrotum and dartos, causing the former to assume an extraordinary size and shape. The large number that I saw labouring under this disease in Egypt, led me to inquire into its causes, its symptoms, its pro-

gress, and its consequences, and to employ the means of cure which our art could afford.

My researches have taught me to consider sarcocele as an endemick of hot climates; at least we rarely meet with it in cold countries, for almost all the cases of it that we see in Europe come from Asia and Africa. The scrotal tumour of Mr. Charles Delacroix, formerly minister of foreign relations, is perhaps the only well attested case of the appearance of true sarcocele in our climate: still it was small when compared with the sarcocele mentioned in the ephemerides of Germany, in 1692, in the chirurgical works of Dionis, and in the *Bibliotheque de Medicine*, Vol. IX or with those that excited my astonishment in Egypt, the least of which, after it had attained its growth, weighed more than 25 kilogrammes.* I shall notice those of the most consequence.

Under the name of sarcocele, I mean that tumour which is formed in the scrotum, like a fleshy mass extended at its inferiour part, and suspended from the pubis by a pedicle of greater or less diameter.

It presents, externally, wrinkles of different sizes, separated by distinct marks or folds, corresponding with the mucous cryptæ and the roots of the hair. We always find a large portion of its surface, more especially if the sarcocele be chronick, covered with yellowish scabs and scales, which falling off, discover so many small herpetick ulcers that discharge an ichorous serum. The tumour is indolent, hard in some parts, and soft in others. It may be pressed and moved in different directions, without producing the least pain. The patient feels no inconvenience from it, except in walking, and from its weight; hence he is obliged to use a suspensory bandage. The

* One kilogramme is equal to 2lbs. 5 drachms 35.15 grains.—Tr.

urine trickles down on the tumour, in consequence of the distance of the urethra, without causing excoriation.

Among the great number of sarcoceles that I have examined, I always found, that the spermatick cords and testicles were in a natural state on the sides and at the root of the tumour. The spermatick vessels were increased both in size and length.

The testes are seldom affected in sarcocele: when this is the case, there are symptoms attending, proper to diseases of these organs. They do not appear to me susceptible of very great distension in any state of disease, for in the latter case the health of the patient is so injured, that he would sink under the symptoms which come on before the sarcocele, properly so called, could arrive at its second stage. The alteration of the testes would then lay the foundation of a disease, which should be considered as very different from sarcocele, and treated according to its particular character.

It is not my intention to describe the diseases which are proper to the testes, and I shall confine myself to an account of the sarcocele, as I saw it in Egypt.

Workmen in general, and such as wrought while sitting, viz. weavers, tailors, embroiderers, &c. were most obnoxious to it. I also think that the breeches which the Egyptians wear, and on which the dependent scrotum rests, may concur in the gradual production of this disease.

Among the internal causes, we may reckon the different taints of the system. Among these is chronick syphilis, which in this country commonly produces pustules on the scrotum, with pruritus, and is neglected by the Egyptians. I also remarked that all who laboured under sarcocele, had the elephantiasis to a greater or less degree. The subject of the narrative, at the conclusion of this memoir, was an example of it. All these causes act

on the membranous substance of the scrotum, and the skin of those parts, which, without doubt, are most liable to the action of all the species of psora. Indeed the skin of the scrotum is the part first attacked. Its laxity, and the great number of mucous cryptæ on its surface, and its deficiency of sensibility dispose it to tumefaction. The vessels of the membranes and of the skin become obstructed, their action is weakened, the scrotum enlarges, and at the same time grows thick and resembles the placenta. The testis retains its shape and integrity; but in a short time it can only be found at the posterior part of the tumour, which grows progressively at every part of its circumference, and especially at its bottom.— The cellular texture and the external membranes of the testes thicken and become fleshy; the skin is distended and becomes thicker in the same ratio. It encroaches on that covering the pubis, the penis, the groins and the parietes of the abdomen, and obliges them to participate in the monstrous growth that the sarcocele insensibly receives, until the hair of the pubis descends below the region of the symphasis. The extremity of the prepuce appears like a kind of navel in some part of the anterior surface of the tumour, generally near its middle. The urine runs off by this opening, and trickles down without jetting out.

The external surface of this fleshy mass becomes rugose and scaly: it retains but little heat, and here and there may be seen cutaneous veins that creep between the epidermis and the skin.

The sarcocele is still susceptible of a greater increase. In the case recorded in the German ephemerides, the tumour weighed about 100 kilogrammes. That of a farmer from Upper Egypt, whose case will be detailed below, was supposed to weigh 50 kilogrammes. In the

different countries of Egypt, I saw ten or twelve nearly of equal weight and dimensions, and of a similar character.

On dissecting these tumours, they are found to be composed of a vascular substance like lard, very hard in some parts, and softer in others. The whole mass has but little sensibility, and the patient feels little pain from cutting it. I found this the case in the extirpation of an incipient sarcocele from a cook of a convent of capuchins at Cairo.

In the school of medicine at Paris, there is a drawing of a sarcocele which had never been extirpated. After the death of the subject, who was afflicted by it, a dissection showed the same appearances as above mentioned. The testes were sound, and the tumour was formed by their exteriour coverings, distended in an extraordinary manner.

An old man of Cairo, aged 60, requested me to see an enormous sarcocele which he had had for 20 years; and its weight was so considerable that he was obliged to keep his bed. In order to get rid of it, he had consulted the physicians of the country, who had tried many means without success, such as fire, concentrated causticks, incisions, and the strongest repercutients. The last physician that he had consulted, passed a large needle, armed with a large skein of linen-thread, through the centre of the tumour, and out on the other side. This operation produced no pain or injury of the testes, and proves that they do not partake of the proportionate increase of the scrotum. This seton was drawn every day, and produced a copious discharge of fetid serum. The patient at the same time had the elephantiasis. The long-continued use of the seton had caused a trifling diminution in the tumour, but promised as little as other means that had been employed. I proposed to amputate it; the patient consented; and I was about to commence the

operation, when I received orders to repair to Alexandria, then threatened by a debarkation of the British. I was obliged to leave the old man without being able to relieve him of his burthen.

To the causes already enumerated, we may add bad diet, intemperance, excess of venery, and the immoderate use of warm bathing, which is common among every class of the Egyptians. A residence in moist and marshy places, the effects of the climate, pressure and injuries of the scrotum, may assist in producing this disease.

Sarcocele might be considered as belonging exclusively to the male sex, were it confined to the parts of generation; but we may view those fleshy tumours which arise in other parts of the body, and especially on the face, where the skin is equally liable to be acted on by the venereal or psorick virus, as so many sarcomatous tumours of a similar character, arising from similar causes. Such tumours are common. There are still local causes which produce them in one part rather than in another; such are falls, mechanical irritation of the skin, want of cleanliness, and the application of active and corrosive substances.

No author within my knowledge has spoken of a similar disease attacking the female parts of generation, although the skin, which forms and covers these parts, is exactly of such a texture as that on the male organs of generation. Perhaps the periodical evacuations, and other resources which nature has provided for women, prevent the growth of these monstrous excrescences that so often are found among men. Still by a singular deviation of nature, a woman named Ammeh Fatoumy, at Grand Cairo, afforded a well-marked case of sarcocele on the labia majora. I shall report this case.

All authors who have written on sarcocele agree in opinion, that the disease is incurable, seeing the want of success which has followed the use of internal and topical remedies. They who have proposed amputation of it, have neglected or feared to reduce it to practice. Mr. Imbert Delonnes has the merit of transcending the opinion of celebrated physicians, by using a cutting instrument on the sarcocele of Charles Delacroix. I knew nothing of the success of his operation* until I had performed one nearly similar to it in Egypt, on a person already noticed; and I had intended to operate on other very large sarcoceles, when the army was ordered to march.

When the disease is in its forming stage, it may be treated simply by the remedies hereafter enumerated: but if it be chronick, there remains no resource but amputation, which should still be preceded by the internal remedies that are proper to destroy the causes of the disease.

Among the best internal remedies, we may enumerate the antimonial preparations combined with mercurial and sudorifick substances, in convenient doses, continued for some time, and alternated with small quantities of mineral acids, in mucilaginous drinks, and in particular the sulphurick acid diluted pro re nata, with a convenient fluid, and applied externally as a lotion: also a solution of the hyper-oxygenated muriate of mercury, the oxid of copper, and muriate of ammonia, the astringent and repercutient qualities of which are assisted by a graduated and uniform compression on all the sarcocele. The success of these means is evident from the sensible dimi-

* See his memoir on this operation: we should have been better satisfied if Mr. Delonnes had described with more exactness, the form of the tumour, the position of the testes, the state of the cord before the operation, and the manner in which he proceeded.

nution of the tumour, by the retraction of the skin, and the improvement of the patient's colour. In such an event, the use of them should be continued with suitable variations, until the tumour is entirely reduced. Incisions and causticks to me appeared useless, and I remember the want of success that the Spanish and English physicians have experienced from their use in a case that has been reported. It is even probable that these means, followed by an application of the astringents of which I have spoken, may produce a cancerous affection. Finally, if, after the use of these means, variously combined for a length of time, the sarcocele remains in the same state, I no longer hesitate to declare the necessity of an operation, and to establish the possibility of practising it without danger.

The necessity is evident, from the insufficiency of other means, and the certain progress of the disease, although the symptoms are not acute. But the life of the patient becomes truly a burthen to him.

It now remains only that I describe the operation:

The vessels which go to this tumour, arise from the branches of the external pudick, and from some ramifications of the internal pudick. The spermaticks are confined to the testes, which are to be preserved. The bleeding that may arise from the former vessels is by no means dangerous, because they may be taken up by ligatures which should be applied in succession, as soon as the arteries are cut. The operation is tedious and troublesome, but not painful. After having extracted the sarcocele, even if it be complicated with elephantiasis, as I have often observed, we need not fear its re-production. But the remedies already pointed out for elephantiasis, should be continued.

There are some general rules to be observed in this operation. Injury of the testes is to be avoided; also, the the spermatick cords, and the corpora cavernosa penis.

Two oblique incisions should be made, beginning at the opening of the prepuce, or at the navel-like point; —these diverging below, will avoid the testes on the sides of the tumour. The parts lying between the corpora cavernosa penis and the testes, should be cut in the same direction with a two-edged knife; taking care to reserve the testes: all the parts below the line of incision, will be taken off. If there be any sarcomatous parts remaining about the penis and the testes, they should be dissected off.

The corpora cavernosa penis should be surrounded, and the testes covered with the integuments which have been spared by the knife. The skin of these parts is so capable of extension, that the edges may be approximated and fixed in contact, by means of adhesive plasters and a suitable bandage: the parts are unloaded, contract, and speedily heal. If hœmorrhage come on, the vessels should be tied; or if they cannot be found, the actual cautery must be used while the cure is assisted by internal remedies.

CASE FIRST.

Jacques Molini, a cook in the convent of capuchins at Grand Cairo, consulted me for a large tumour of the scrotum, that he had had for several years: it was of a pyramidal form, and weighed about three kilogrammes. The right testis was sound and remained at the superiour part of the tumour: the penis had almost entirely disappeared: the left testis was so surrounded by the fleshy mass which formed the sarcocele, that I could not possibly distinguish it. I still doubted much whether it formed a part of the tumour, as the patient had never felt pain.

This tumour was generally of the consistence of lard; but in some parts almost cartilaginous. In the midst of this irregular mass, I found the testes reduced to a small size. The dressing of the wound was simple and methodical. The cure was not impeded by any accident, and at my departure from Cairo for Alexandria, I left the patient with good prospects of recovery.

CASE SECOND.

I did intend to operate on an Egyptian from Qene, in Upper Egypt, and to make a drawing of his sarcocele, in order to retain its size and shape. Being prevented by circumstances from fulfilling my intentions, I was not willing to leave Egypt, without a sketch of this enormous tumour. I requested Mr. Balzac, member of the commission of arts, to take a drawing of the sarcocele of this man, Mahammed Ibrahym, whom I saw at Alexdria. This mussulman, about sixty years of age, was blind; and on his inferiour extremities, had a well-marked elephantiasis. His feet were monstrous, and his legs twice as large as his thighs. The skin towards the superiour part of the leg, was glossy, marbled, and intersected here and there by winding veins: the other half, and the foot, were covered with thick, rough, yellowish scabs in strata and distinct, especially about the joints, by deep and ulcerated furrows, whence distilled an ichorous and fetid humour. The scabs were more copious on the insteps and ankles, than elsewhere. Deep fissures were seen between the toes and the sole of the foot. Pressure on the tightest parts produced no pain, or sensible impression. The cellular texture and skin, gave the resistance of cartilage.*

* See plate IX.

This man had lost his sight by the endemick ophthalmia: he was sallow, weak in constitution, and dragging out a miserable existence.

The tumour was not weighed, but if I might judge of it by comparison with that of Lajoux,* which was seen some time since at Toulouse, weighing forty-one kilogrammes, the sarcocele of Ibrahym being larger, might weigh fifty. It was oval, and on its lower half, studded with rugose tubercles, and marked with yellowish scabs, furrows and sinuses; it was hard, renitent at some points, and soft without fluctuation at others, and throughout its circumference of a blackish brown colour. An oblong opening appeared at its middle and anterior part, surrounded by a thick callous border, formed by the prepuce. This opening led to the urethra, which was oblique upwards and backwards towards the pubis. The corpora cavernosa were felt anteriourly at the centre of the pedicle of the tumour: and the testes laterally and behind: they appeared to be sound. The cords and spermatick vessels were elongated, and of considerable size; and the arteries which could be felt pulsating, seemed to have enlarged in their calibre. The skin of the abdomen was also elongated, in order to admit of the enlargement of the tumour, so that the hair of the pubis was drawn below this region, and the umbilicus brought near it. The dimensions of the tumour may be known by the scale at the bottom of the plate.

This mass being supported by a suspensory bandage, caused no other inconvenience than by its weight to impede loco-motion.

* According to the account that was given me, Lajoux's tumour, of which I saw only a drawing, contained a large quantity of serum, a portion of epiploon, and probably of intestines, a proof that it was not true sarcocele.

CASE THIRD.

A farmer of Upper Egypt, had had for twelve or fifteen years, a sarcocele which continued to increase.—When I saw him at Cairo, this tumour was very large, and weighed about fifty kilogrammes: it extended to the bottoms of the legs, and kept them asunder; it was of a roundish form, of a deep brown, unequal in the greater part of its circumferences, and spotted with herpetick scabs, like the sarcocele of Ibrahym. The prepuce also appeared at the centre of the tumour, and the testes occupied the sides of the superiour part.

After having placed himself under the care of the Egyptian physicians, he applied to an English physician, who was travelling in Egypt. In expectation of a perfect cure, he consented to the application of the actual cautery; but it produced no benefit, and the tumour remained in the same state. Some years after, he consulted a Spanish physician, who was travelling; and who plunged a cutting instrument deep into the middle of the tumour, under the impression that the disease was a hydrosarcocele. Nothing issued from it but a little blood, and the sarcocele, notwithstanding this treatment, continued to increase.

From these two operations, the patient informed me, he experienced little or no pain, and no unpleasant symptoms ensued. The scars were visible on our arrival in Egypt, and he was disposed to submit to amputation, which I had proposed; but I was prevented from undertaking it, by the causes above-mentioned.

CASE FOURTH.

Ammeh Fatoumy, aged thirty years, the wife of a labourer of Cairo, was admitted into the civil hospital with two large tumours which had continued for many years.

These tumours,* which were delineated by Mr. Redoute, member of the institute of Egypt, were situated one on each side, on the edge of the vulva, contiguous before, and situated a small distance behind. They appeared to have arisen from the external labia, for no vestige of the foldings of the integuments there, or of the nymphæ remained. They were similar in size: each resembling the head of a child. They were rugose, unequal in three-fourths of their circumference; glossy, and of a violet red on the inside: their angular edges, or rather their bases were covered with pustulous scabs like those on the sarcocele of Ibrahym, and discharged a disagreeable tumour, similar in appearance. These tumours were suspended or attached by small pedicles, to the rami of the ischia and pubis. They were hard, insensible, and apparently scirrhous: each of them was thirteen inches and some lines in circumference, four inches six lines in the transverse diameter, and seven inches in length. This woman had a delicate constitution, and her feet showed an incipient elephantiasis; her lips were thick and lead-coloured, her gums pale and ulcerated, her countenance discoloured, her eyes heavy, appetite depraved, and she was disposed to melancholy: in other respects, the digestive functions were well performed. I attributed the formation of the sarcocele to taint of elephantiasis, with which she was affected. It should be observed, that she never had menstruated.

* See plate X.

I proposed to extirpate these tumours, and I put the patient on the use of the plan that I had found successful in elephantiasis. After six weeks of this treatment, the swelling of the feet, legs, and lips, had assuaged, and they had returned nearly to their natural state. The tumours were in some degree softer. The humour which transuded from the scabby ulcers, was less in quantity, and had lost its fetid smell: finally, I thought that this woman who was then growing fat, was in a condition to submit to an operation.

The propriety of amputating the sarcocele of this woman, and of Ibrahym, had been decided on in a clinical consultation, called in these cases, and the operation was fixed for the next day: but we were ordered on the same day to follow the army to Alexandria, and I was obliged to give up the care of both these cases.

SECTION VIII.

The state of rest and tranquillity that I then enjoyed, enabled me to collect and arrange the surgical observations that I had made since the commencement of the expedition—observations worthy of notice, on account of the phenomena which some species of wounds presented, for a favourable termination of a greater part of them, and the influence that the climate of Egypt and Syria had on them.

In order to detail these facts with method, I shall notice the wounds of the head, face, throat, thorax, abdomen, pelvis, and extremities, turning aside to the important operations which they required: and I shall antici-

pate in my narrative, some wounds of the same kind that happened under other circumstances.

I shall also describe the effects of wounds produced by the arms of the Turks and Arabs.

SURGERY.

The wounds that our soldiers received in Syria from fire-arms on the superiour extremities, complicated with fracture, especially, wounds of the humerus, although dressed according to art, were almost all followed by accidental articulations. The two ends of the broken bone remained moveable, because their continual friction wore off their asperities, and their salient angles. The extremities of the fractured portions became rounded and covered with a cartilaginous substance, that facilitated their motion, which the wounded performed in different directions, and in an imperfect manner, but without pain. We sent back many such invalids to France.

I attributed this accidental articulation:

1st. To the continual motion to which the wounded were exposed after their departure from Syria, until their arrival in Egypt, and being obliged to travel mounted or on foot.

2d. To the bad quality of their food, and to the brackish water that they were forced to drink on this tedious journey.

3d. To the state of the atmosphere in Syria, that is almost deprived of vital air, and loaded with pernicious vapours arising from the numerous marshes near which we remained a long time.

All these causes might prevent the formation of callus, either by diminishing the phosphate of lime, or by

destroying that relation which the bones should constantly bear to each other, before they can form an union.*

Retentive bandages, alkaline embrocations, aromaticks, rest, and diet, produced no effect. Perhaps a change of climate, and the use of mineral waters, might have a favourable effect on soldiers who have this kind of articulation.†

* Our author does not seem to admit here the opinion that callus, which unites broken bones, is the production of a set of vessels which assume the functions of a gland, for this purpose, around the fractured part. Whatever acts on the general system, and debilitates it, must also suspend the action of these glandular vessels, in common with other parts of the system, and prevent ossification.—Tr.

† I should never recommend the plan proposed by some authors, and adopted by several celebrated practitioners, of laying bare the fractured extremities of the bone, and sawing off their ends; the bones are then replaced, and kept in apposition, until a complete consolidation is effected. A successful result seldom follows this treatment, and I know of but two cases that have been cured by this practice: the first was by Mr. White, an English surgeon, and the second by Mr. Viguerie, jun. first surgeon of the hotel Dieu, of Toulouse: but a great number of others who submitted to this operation, have sunk under its consequences. A modern work on "the Diseases of the Bones," gives a striking case. I do not approve the practice of those, who, with a large pointed needle, pass a selon through the diameter of the limb, between the two fragments of bone, to inflame their extremities, and thus to produce a union. This means, perhaps less dangerous than the former, promises no better success, although it succeeded in one case. For this we are indebted to Dr. Philip S. Physick, surgeon, of Philadelphia, who is quoted as its author in a thesis No. 428, defended at Paris, March 27th, 1805, by M. Laroche, surgeon major.

This success was no doubt obtained because the false articulation was of short continuance, and no loss of bone had taken place in the fractured part, and, because the bones were contiguous, and the subject young.

During the first period of treating a fracture, if a union of the fractured bones has not been effected by the means pointed out, the case should be abandoned to nature. Pa-

In the same campaign, it happened that very slight wounds of the shoulders, without lesion of the bones, were succeeded, in almost every instance, by a complete or partial paralysis of the limb of the wounded side. This seldom happens in Europe, unless the principal nerves be cut or diminished.

In these wounds, I suspected an injury of some of the superficial branches of the cervical pair of nerves, which from their communication with the brachial plexus, might disturb the course of the nervous fluid in the branches of this plexus: it is also possible that the asthenick and stupefactive qualities of the climate of Syria, during the season in which we were there, had predisposed injured limbs to paralysis.

On our return to Egypt, where the air is more pure, motion and sensibility were restored to many paralyzed

tients become accustomed to this infirmity, and its effects diminish by time and exercise, and the injured limb becomes eventually almost as useful as its fellow that is sound. I have seen many such cases. There are two such remarkable cases in the imperial guard: the first, a soldier of the train of *ambulance*, who has an accidental articulation in the left arm, with loss of substance in the middle of the humerus, of about six centimetres. But, notwithstanding the infirmity, this man could do his duty very well.

The second case occurred in the person of a grenadier, and this accidental articulation terminated as the above case. With his left arm, he did the duty of a soldier of the train of *ambulance*. As I was about to give him a final discharge, he requested to be employed in the equipage of the guards.

—We cannot here agree with the author in his opinion of the practice which our countryman, Dr. Physick, has introduced, to effect the re-union of the bones in false articulations. The first case in which it succeeded, was of several months' continuance. The seton is said to have succeeded in several other cases, although it has failed in many instances.

The American practice is certainly preferable to any other, which has as yet been recommended or adopted; and, if not successful, is not dangerous.—Tr.

limbs that had been wounded, by moxa repeatedly applied according to circumstances, and followed by the immediate application of ammoniack, to prevent inflammation and suppuration of the cauterized part.* The use of hot mineral waters, and a residence in the climate of Egypt, have completed the cure of some with whom the moxa did not succeed.†

But if the wounds of our soldiers in Egypt and Syria, during the unfavourable season of *khamsyn*, were attended with many unexpected symptoms in consequence of the state of the atmosphere at this season; on the other hand solutions of continuity were readily healed in Egypt, during the prevalence of the north winds. The sky is at this time clear and serene, the scorching and uniform heat of the day is always tempered by the winds, which begin to blow at sun-rise, and continue while the sun remains above the horizon. To these benign effects we may add, in addition to the assistance of art, the quality

* In the first volume of the acts of the medical society, may be found the extract of a memoir which I presented in 1797, on the advantages of this means in cases of paralysis.

† Relapses, in cases of paralysis, were common where it was the consequence of wounds or of the plague: I remarked that this happened in Europe as well as in Egypt, in warm moist climates, and especially in the spring. Gen. Dorsen, then colonel in the imperial guard, who had been wounded at the battle of Aboukir, in 1801, by a ball on the top of the shoulder, in returning from St Cloud, in July 1806, was attacked by a complete paralysis of the arm of the same side. The sensibility and motion of this extremity were totally lost. Aromatick embrocations, alkaline, stimulating, and epispastick applications to the cicatrices removed the paralysis, and restored the limb to its sensibility and motion: when the general was thus affected, the weather was stormy and the heat excessive. These phenomena confirm the influence which the electrick fluid, and other atmospherick combinations exert on the nervous system.

of a particular kind of lint that we used,* the good state of the hospitals, their healthy situation, and excellent order.

This combination of circumstances will serve to show why the wounds of amputated limbs healed before the 30th day; and why the operation for the stone was followed by a cure in fifteen days: why the operation of trepanning succeeded, and finally, why large wounds which penetrated the thorax and abdomen, with those of the extremities, attended by a loss of substance, were cured so soon, and without ill consequences. I shall notice the most important cases.

The majority of authors have forbidden us to apply the trepan on the frontal sinus, on account of the unequal depth of its cavities, and the aerial fistulas which succeed, and are by them considered as incurable.

I have deviated from this advice in two cases of fracture of the two walls of this sinus. The trepan was applied without difficulty, and the operation was successful.

Francis Berrard, a guide of the army, at the third assault of Acre, received a gun-shot wound on the right frontal sinus. The ball fractured the external wall of this sinus, and then split into two pieces; one half of it passed under the forehead, and tore up the skin, about a centimeter in extent; the other penetrated the sinus, and fractured its internal wall. The consequences were a loss of understanding, and some slight symptoms of concussion.

The exteriour fracture was of limited extent, and might have been considered too small for the passage of half a bullet. As the fragments were not displaced, I was obliged to apply the crown of a trepan on the sinus, and by this means I discovered the extraneous body, and a fracture of the internal wall of this cavity. I easily

* Virgin lint, made with new linen, beaten and washed.

extracted the bullet with an elevator, and the opening made by the first trepan allowed me to introduce a second of smaller size and conical shape, with which, without any accident, I perforated the wall of the sinus. Between the cranium and dura mater, was a little effusion of blood, which escaped through the opening. The symptoms abated, and in a few days disappeared. The edges of the opening exfoliated, the holes were closed by a membranous substance, and the wound of the external integuments immediately healed without aerial fistulas.

In the same engagement, a case exactly similar occurred in the person of Fromentin, a grenadier of the 69th demi-brigade. A portion of the ball was also introduced into the left frontal sinus, and had produced a considerable fracture of its two walls. The first was reduced to fragments, which were easily extracted; but it was necessary to apply the crown of a small trepan on the internal wall, which restored the functions that had been disordered by this accident, and the patient was cured, as in the above case.

I have also applied the trepan over the course of the spheno-spinalis* artery, at the anteriour inferiour angle of the parietal bone. The artery was broken, but I soon arrested the hœmorrhage by the application of an iron stylet, brought to a red heat,† and the patient was cured, as were many of a similar kind, that were trepanned with like success. Among these was one of a remarkable character.

A soldier of the 18th demi-brigade received a ball on his head at the first revolt of Cairo, which after having

* Arteria Meningea of Bell.—Tr.

† I owe the knowledge and successful application of this means, as well as many others, to my uncle and first preceptor, Mr. Larrey, professour at Toulouse, as before noticed.

penetrated the frontal bone at its middle, near the frontal sinus, passed obliquely behind, between the cranium and the dura mater, and along the longitudinal sinus to the occipital suture, where it stopped. It produced all the symptoms of compression. We were not able to decide on the seat of the extraneous body, but the patient always described his pain at the point diametrically opposite to that where the ball entered, and other symptoms left no doubt of its situation in the inside of the cranium.

I introduced a sound of gum elastick in the hole of the os frontis, and passed it with ease on to the ball, which I knew by its resistance and irregularity. I then measured the distance with the same instrument, and determined to lay bare the part of the cranium corresponding with the bullet. I made a counter opening with a large trepan; a quantity of pus was discharged, and I found no difficulty in extracting the ball, which depressed the dura mater, and compressed the brain. The cure went on well.

This case proves, in opposition to the opinion generally advanced by authors, that it is not improper or unnecessary to search for foreign bodies that have passed into the cranium, provided it be done with care and dexterity. From it I have also concluded, that counter openings in the cranium are sometimes necessary in cases of fracture, complicated with the presence of foreign bodies.

I have seen gun-shot wounds of the face which had nearly destroyed the jaws, and the patients were cured without losing their speech, the power of swallowing, or even that of chewing.

Louis Vaute, a corporal of the 88th demi-brigade of infantry, during the siege of Alexandria, in 1801, received a ball in his face, which carried away the greater part of the lower jaw, and three fourths of the superiour. A dreadful wound was the consequence, with a

loss of substance in the lower jaw, from the second molar tooth on the right side, to its articulation with the temporal bone. The two ossa malarum were entirely broken up, with the bones of the nose, the ethmoid bone, and all the osseous portions of the nasal fossæ. The os malæ of the right side, and the zigoma were also destroyed: the eye of the same side was burst, and the soft parts corresponding to the above portions of bones were removed. The tongue was cut half off in its lateral and longitudinal diameter; finally, the fauces and the posterior nares were entirely uncovered. The destruction of large flaps of the integuments and muscles of the neck and left cheek, had denuded the jugular vessels and the articular fossa of the temporal bone.—Such was the state of this dreadful wound when I found the unfortunate subject of it in a corner of the hospital at Alexandria, where his comrades had laid him, under the belief that he was dead. Indeed his pulse was scarcely perceptible, and his body cold, and without apparent motion.

As he had taken nothing for two days, my first care was to make him swallow, through an œsophagus tube, two cups of broth and a little wine. His spirits revived, he sat up without assistance, and made signs. I washed the wound, removed all foreign bodies, cut off all the disorganized and ragged parts, and applied the ligature on the vessels that I opened: finally, after having cooled the flaps, I restored them to their former situation, and fitted them to each other as closely as possible, and kept them confined by several sutures. I also re-united the separated portion of the tongue by the same means: I covered all the excavation with a large split roller, dipped in warm wine; I applied fine lint-compresses and a supporting bandage.

Although I had no reason to expect the recovery of this man, I continued to attend him. He swallowed every third hour a draught of broth, and some spoonfuls of good wine, by means of the gum elastick tube, fitted to a funnel. The dressings were frequently renewed on account of the great discharge of saliva and other fluids.

This plan was followed by the happiest results, and Louis continued to improve: laudable suppuration came on, the eschars sloughed off, the edges of this great wound approached each other, the united parts soon adhered, and this soldier was able to return to France thirty-five days after the accident, and his wounds finally healed up.

After having been supported for the first fifteen days by means of the tube, this man was able to swallow broth and pap with a sucking bottle, and afterwards with a spoon. He finally regained his health and flesh.

This soldier may now be seen at the imperial hotel for invalids. He can speak so as to be understood and especially when this large opening is covered with a silver mask.

Gun-shot wounds of the soft walls of the mouth were cured almost without deformity, when the suture was immediately practised.

Mr. ***, aid-de-camp to general Verdier, received a pistol-ball in his mouth, which carried away all the left cheek from the commissure of the lips to the masseter, so that the two alveolar arches, the tongue, and a portion of this muscle were laid bare. The edges of the wound were tumid and black, and he already felt acute pain. I cooled the flaps and placed their edges in apposition, and retained them so by nine sutures,* and a suitable bandage.

* I used the needles before described as in the plate.

The patient was put on regimen and cooling medicines, to prevent fever and other symptoms. He was discharged with but little deformity, after seventeen days. A similar case happened under my notice on the Rhine.

Fournier, a grenadier of the 9th demi-brigade, retained a portion of a bayonet, in size about three centimetres, for six weeks on the left side of the throat, under the pillars of the velum palati. This foreign substance, which had been unsuccessfully sought for, had almost caused the loss of speech; I felt it at the bottom of the fauces. I performed pharyngotomy, divided its envelope, laid bare the fragment, and extracted it. His speech was immediately restored, and he recovered in a few days. It appeared that this piece of bayonet compressed the laryngeal nerve of the eighth pair, which is necessary to the voice.

Michel, a soldier of the 32d demi-brigade, was wounded on the 21st of March, 1801, at Aboukir, by a ball, that entered at the angle of the jaw, and passed obliquely across the throat, and out at the opposite side of the neck. The base of the tongue was split, and the epiglottis cut off; he spit it from his mouth, and showed it to the surgeon who came to his assistance.

The patient suffered but little pain, but his voice was indistinct, hoarse, and very weak.

When he first attempted to swallow, he was seized with a convulsive suffocating cough, attended with vomiting. The thirst which ensued from his wound, and the heat of the weather, induced him to repeat these attempts—the same consequences followed: thus he remained four days. He already experienced violent pains of the stomach, loss of sleep, small and quick pulse, and emaciation had commenced.

Such was the condition of this man when I visited him on the morning of the fifth day. Having interroga-

ted him concerning what had passed since his wound, having tried to give him drink, and having examined the inside of the mouth, I was convinced that the cause of these suffocations, and the difficulty of swallowing, depended on the permanent opening of the glottis, the valve of which had been cut off by the ball, an accident I believe without precedent. The prognosis was unfavourable in this case, and there is no doubt, had he been abandoned to nature, he would soon have died. The first indication was to appease hunger or thirst; indeed this was all that art could do in such a case. I was fortunately furnished with an œsophagus tube of gum elastick, which, with the necessary precautions, I introduced into the pharynx, and thus enabled him to swallow a small quantity of nourishing drink, and afterwards gave him good broth.

I repeated this operation in presence of the attending surgeon, and I directed him to repeat it as often as circumstances might require. I watched this case, and I was convinced of what M. Desault had before remarked, that the sensibility of the mucous membrane of the larynx is relative. For the smallest drop of liquid, when introduced into the larynx in this case, produced instantaneously all the symptoms above mentioned: whereas the introduction of the sound into the same organ, caused no more inconvenience than if it had been passed into the pharynx; and on account of this similarity of effect a mistake was sometimes made. We could not determine whether the tube was in the larynx or pharynx, until a few drops of fluid had been introduced. If in the former, a suffocating cough was the result.

The passage of air is not always the certain sign of the presence of the sound in the larynx, as authors state, for air may be discharged when it is evidently in the œsophagus.

To avoid this inconvenience, I directed the tube horizontally and backwards to the cervical wall of the fauces, and pushed it gently in the same direction, obliging it to curve slightly to enter the pharynx; and, in order to be sure of this, I passed a few drops of fluid before the drinks were given. When I failed in this mode of introducing the tube, I directed it with my finger into the aperture of the œsophagus.

This means being continued, saved this soldier's life: his wound cleansed, suppurated but little, and healed soon: but the difficulty of swallowing always remained; his speech returned slowly, and was then imperfect. In six weeks he could swallow a little thick panado without the tube: the first attempts were very painful, but afterwards became less so, and, at his departure for France, he ate thick rice made in the form of balls, which, from their size and consistence, could pass over the glottis without falling into it. When this man was placed in the corps of invalids, I gave him a particular certificate, by which he procured such food as suited his condition. The functions of speech and deglutition improved in time: no doubt the aretænoid cartilages in a measure supplied the place of the epiglottis by their increase of size, with the expansion of that part of the base of the tongue, corresponding to the glottis.

General Murat was wounded at the battle of Aboukir, in 1799, in the moment of victory. A ball passed through the throat, from the right angle of the jaw, to the left side of the neck, near the superiour insertion of the sterno-mastoideus muscle. It cut off a part of the masseter muscle, and penetrated into the mouth; in going obliquely backwards, and downwards, it probably injured the ninth pair of nerves; passed in front of the jugular vessels, and came out below the insertion of the mastoid muscle.

Deglutition became very difficult, and the voice hoarse and interrupted. I dressed him on the field of battle, and attended him till we set out for Cairo, when his wounds were healing.

I have already spoken of a wound of the neck, with rupture of the external carotid, which was cured by compression.*

Peter Goult, of the 22d chasseurs, at the battle of Salehyeh, was wounded by a mameluke, with a sabre, which, after cutting off the skin and external protuberance of the occipital bone, divided the extensive muscles of the head, to the sixth cervical vertebra which also had its spinous apophysis cut off. A large flap was thus laid on his shoulder, and his chin rested on the sternum.

I effected the re-union of this large wound, by means of several large sutures, and the uniting bandage. The patient in a short time returned to his corps, perfectly cured.†

Wounds of the chest also presented some irregular phenomena, which required some additions and alterations in the means of cure.

The number of soldiers that died of hœmorrhage in consequence of wounds penetrating the chest, and injuring the lungs, induced me to attend minutely to such accidents.

A soldier was brought to the hospital of the fortress of Ibrahym Bey, immediately after a wound of this kind,

* It is always advisable and safe, to apply the ligature on every wounded artery. If this practice be necessary in arteries of less importance, and inferiour size, as is admitted by the best surgeons, it certainly should be adopted in cases of wounded carotid. Compression should never be considered as sufficient.—Tr.

† I afterwards saw this soldier, who informed me that after this wound, he had been deprived of the powers of generation.

made by a cutting instrument, that penetrated the thorax, between the fifth and sixth true ribs, and followed their direction: it was about eight centimetres in extent: a large quantity of frothy and vermilion blood escaped from it with a hissing noise, at each inspiration. His extremities were cold, pulse scarcely perceptible, countenance discoloured, and respiration short and laborious; in short, he was every moment threatened with a fatal suffocation.

After having examined the wound, and the divided edges of the parts, I immediately approximated the two lips of the wound, and retained them by means of adhesive plasters, and a suitable bandage round the body.

In adopting this plan, I intended only to hide from the sight of the patient and his comrades, the distressing spectacle of a hæmorrhage, which would soon prove fatal: and I therefore thought, that the effusion of blood into the cavity of the thorax, could not increase the danger.

But the wound was scarcely closed, when he breathed more freely, and felt easier. The heat of the body soon returned, and the pulse rose: in a few hours he became quite calm, and to my great surprize, grew better. He was cured in a very few days, and without difficulty. At the hospital of the imperial guard, we had two cases exactly similar.

CASE FIRST.

Nicholas Germain, of the first battalion of chasseurs of the guards, was taken to the hospital in a dying state. He had a large wound in the thorax, between the fourth and fifth rib of the right side. I easily discovered with my finger, a deep wound of the lungs, and every act of inspiration threw out red blood filled with bubbles of

air. The patient had suffocation, great distress, and syncope: his face was pale, his eyes dull, pulse imperceptible, and extremities cold: in short, I expected that every moment would be his last.

The success of the treatment above-mentioned, induced me to resort to it now. I hastened to close this wound, and to unite its edges with adhesive plaster and a bandage. The unfavourable symptoms were suspended; but from the loss of blood, the patient remained some time before he recovered; he grew better daily, and was cured by particular care, rest, and regimen. His convalescence was tedious, but not painful.

CASE SECOND.

Jean Castez, brigadier of cavalry, on the 9th of April, 1803, was carried to the hospital, with a wound of less breadth, but of equal depth, between the fifth and sixth ribs, and of the same side. His lungs were injured, there was considerable loss of red frothy blood, hemoptoe, paleness of the face, general faintness, diminution of the pulse, and great difficulty of respiration.

The division of the skin not being so large as the intercostal muscles, I enlarged it sufficiently, upwards and downwards, laid him on the same side, to favour the escape of the blood from the chest, and then closed the wound by bringing its edges in contact, and retaining them so, by adhesive straps. All the symptoms immediately disappeared, and the patient recovered.

Since Ambroise Pare, all practitioners and authors, who have written on wounds of the thorax, advise not to close the wounds which penetrate this cavity, especially, when they are followed by hœmorrhage. On the contrary, they advise us to facilitate the escape of the blood, by placing the patient in a suitable posture; to enlarge

the wound by incisions; to introduce a canula, or pledgets of lint. But the ancients closed such wounds, and even used sutures to make them more exact.

Ambroise Pare himself quotes a cure, obtained in consequence of this treatment, at the time when Vigo wrote his "Treatise on the Wounds of the Thorax," Chap. X. "Surgeons are divided as to the manner of dressing wounds that penetrate into the thorax." Which proves that many old practitioners dressed these wounds with a view to prevent the introduction of air into this cavity.

The surprising success that attended these three apparently mortal wounds in the cases just detailed, led me to believe that this practice is preferable to that which is now adopted. Because the latter throws many serious obstacles in the way of nature, or arrests her altogether, as Valentin has shown in his "*Recherches Critiques.*"

I shall attempt to explain why the symptoms which succeed a wound that penetrates the thorax, and is accompanied by hœmorrhage, from injury of the pulmonary vessels, ceases immediately after the wound is closed.

One wall of the thorax being opened, the air which by inspiration is taken into the bronchial system, must escape where there is the least resistance, and it will escape by the wound, especially when it is as large, or larger than the opening of the glottis; still this air, in passing through the opening of the lungs, prevents the adhesion of its edges and the expansion of the pulmonary vessels necessary to diminish the current of blood in the arteries, and to accelerate its return in the veins; hence the hœmorrhage is kept up, and hence the unfavourable symptoms consequent on such wounds; the hœmorrhage is also aggravated by introducing tents, or any extraneous substance into the thorax. The external air acting on the lungs, through the aperture of the wound, irritates

them, and may even arrest respiration altogether, if it be introduced in a column larger than that which passes through the trachea; for this reason authors advise not to open two wounds at the same time, which have penetrated the thorax. When the wound is closed by an exact apposition of its edges, after having placed the patient in a position favourable to the escape of the blood that has been effused, the air which passes into the pulmonary system, no longer finding vent, completely fills the bronchial vessels, facilitates the return of blood towards the heart, causes the divided portions of the lungs to approach, so that they soon form adhesions, stop the orifices of the vessels, and consequently produce a more speedy adhesion of their walls, which can alone arrest the hæmorrhage. Experience supports this reasoning, and nature points out to us the same plan, in the case of the peasant of Albrecht, who was stabbed with a knife in the thorax, and had his lungs injured.* This man perceiving that he was losing all his blood, determined to lie on the wounded side: by so doing, his wound was stopped up, the hœmorrhage ceased, and to the great surprise of the surgeon, he was well on the fourteenth day. What have we to fear from this treatment? The effusion? But even admitting that it may take place, which I do not believe, for reasons just given, it would be better to make another opening (an easy and simple operation) to discharge it, than to leave the patient to die of hæmorrhage, a fate from which a great number of our wounded have been preserved. Effusion does not take place, to a great degree, when the blood proceeds from the pulmonary vessels only, unless they be very large; and in such case, the assistence of art is generally useless. The patient dies before we can relieve him. The injury

* Albrecht, act. ph. Med. germ. vol. V. obs. 141.

of the intercostal artery, demands a different treatment, of which I shall not speak. When a small quantity of effused blood remains in the thorax, as in the second case, it will easily be absorbed, and nature is not hindered by it in her operations.

From these principles, I will advance these conclusions, that when wounds made by cutting instruments, penetrate the thorax, and are attended by hæmorrhage, without injury of the intercostal artery, we should close them, keep the patient very still, apply cups in the neighbourhood of the wound, to promote the absorption of the effused blood, and to prevent inflammation: and finally, put the patient on cooling mucilaginous, and slightly antispasmodick medicines.* Such is the result of the observations which I have had an opportunity of making while in Egypt, on wounds which penetrated the thorax.

In Egypt, we frequently performed the operation for empyema with complete success. It is by no means difficult, being very simple in itself. But I remarked that it was more successful when we varied from the part pointed out by authors; at least it proved so in the cases in which I operated for effusions of blood. I operated on the right side, in one or two of the spaces between the ribs higher than is directed, and at an equal distance from the left side, because experience has taught me that effused blood in the thorax acts like an extraneous body and irritates more or less, causing adhesions to take place between the pleura costalis, and the corresponding parts of the arch of the diaphragm; thus diminishing the capacity of the chest, and removing the principal part of the blood from the place formerly designated for the opera-

* This doctrine is now taught at Lyons by Mr. Petit, and at Paris by Messrs. Pelletan and Boyer.

tion. On this account, I have seen it frequently fail, and on opening the dead body, the effusion was found.

The symptoms given by Valentin, and especially, the ecchymosis, enabled me always to distinguish effusion. In opposition to the opinion of my colleagues, I have often plunged a bistoury into the thorax, and the escape of the effused fluid confirmed my prognosis.*

I shall make a few observations on wounds, and particular diseases of the abdomen, which occurred in Egypt.

Pierre Bayard, a corporal of the 18th demi-brigade, experienced a periodical loss of about a *litre*† of blood from the umbilicus. The hæmorrhages were preceded by symptoms of turgescence, and followed by natural health, and then the umbilicus appeared as usual, without any solution of continuity. At the approach of this sanguineous flux, the umbilicus swelled, assumed a blue colour, opened, and discharged a considerable quantity of oleaginous blueish blood, which continued to leak out for the space of forty-eight hours. The abdomen of this man was always slightly distended, and his liver hard and obstructed. There is no doubt that this discharge of blood was from the umbilical vein, the lumen of which still remained open, although this is a rare occurrence: on this account, the case was remarkable.

We had several cases of complete recovery from wounds of the abdomen, complicated with injury of the intestines and bladder. I shall relate those that were most remarkable.

* At the end of this work, I shall speak of effusions in the thorax, sanguineous and purulent, as well as the operation of empyema.

† The unit of measures of capacity, according to the Rep. Division = 50,412416 cubick French inches.—Tr.

Mr. N*** at the assault of Cairo, in 1799, was wounded by a ball in the abdomen, which divided the muscular walls of this cavity, on the right side, and a part of the intestine ileum. Being on the field of battle, I attended immediately to him: the two ends of the intestines were ruptured, separated from each other, and tumefied; the superiour end was turned up on itself, so that its edge was retracted, like the prepuce in paraphymosis, and caused a strangulation of the intestinal canal: the discharge of the fœces was prevented, and they were accumulated behind this obstruction.

Although I almost despaired of this man's recovery, on account of the nature of the wound, and the extreme debility to which he was reduced, by the cholera morbus, which had attacked him while he was left a short time in the entrenchment without assistance, yet I endeavoured to apply a remedy to his singular case.

By four small incisions with the crooked scissors, I divided the neck of the strangulated intestine, and returned it to its ordinary situation. I passed a ligature into the portion of the mesentery, corresponding to the two ends of the intestines. I returned them as far as the edge of the wound, which I took care to dilate, and after dressing it, waited the result. The first days were unpromising; then the symptoms abated. Those which were connected with the alimentary evacuations improved daily: and after two months' attention, the two ends of the ilium were in apposition, and ready to adhere. I assisted nature; I had the patient dressed with a plug, (according to the ingenious plan of M. Desault,) which was continued with intermissions for two months. This soldier left the hospital completely cured.

The sigmoid curve of the colon was often wounded, and the wounds were cured without leaving an artificial anus. We had three such cases at the siege of Acre, and

two at Cairo. I took care to dilate the parts where the ball made its entry, and its exit: directed frequent enemata of flax-seed, and demulcent drinks, and ordered them to observe a strict regimen, and the most perfect rest.

Wounds of the bladder, in general, terminated equally well. Of these, the case of Francis Chaumette, of the 22d regiment of cavalry, who was wounded at the battle of Tabor, is the most remarkable. The ball passed through the hypogastrick region, across the pelvis, to that point of the left buttock, which is opposite the sciatick notch. The direction of the wound, and the escape of fœcal matter and urine from both orifices, gave evidence that the bladder and rectum were injured. M. Milioz, who had the surgical direction of Kleber's division, carefully pursued the plan that had been adopted at Acre: the patient had fever when suppuration came on, and the pus was abundant, when the sloughs came away. A sound being introduced into the bladder, prevented the diffusion of urine, and facilitated the adhesion of the edges of the wounds of this viscus, which healed first. This man was perfectly well when he returned to Cairo.

I shall notice another case of Dacio, a corporal of the 9th demi-brigade, about 27 years of age, who was shot in the 11th assault on Acre. The ball went through the right buttock near the isciatick tuberosity, into the pelvis, and through the lower part of the bladder. The rectum was injured, and the ball came out in the perineum, where the operation of lithotomy is generally performed: it turned forward to the right, elevated a portion of the triceps femoris, and came out in the right groin near the crural arch, and on the inside of the crural vessels, which fortunately escaped unhurt.

The sudden discharges of urine through the inferiour wounds, and the involuntary expulsion of fœces produced by the rupture of the sphincter ani, pointed out the injury of these organs. The patient suffered acute pain, and was uneasy, agitated, and in a state of insupportable tenesmus. The fever came on in the first twenty-four hours, and was very considerable until the eschars separated.

This man having been brought to my *ambulance*, I first attended to him, and continued to direct his treatment until he was cured. I first dilated the external wounds deeply, and the first day I passed an elastick sound into the bladder, to prevent the diffusion of urine. I had a tent covered with cerate passed into the rectum; I prescribed clysters and a cooling regimen. At first he was very ill; when the sloughs came away on the ninth or tenth day, the symptoms abated: he passed but little urine through the wound, and seldom discharged fœces through it. The wound of the buttock healed first; then that of the groin: but that in the perineum did not heal until it had been under my direction six weeks, and entrusted to the particular care of my pupil, Mr. Zink.—He recovered entirely, and had neither incontinence of urine or fœces.

Desjardins, a fusileer of the 32d demi brigade, was wounded in a sortie of the garrison of Acre, by a ball, which passed through the pelvis from the left sciatick notch, to the scrotum of the right side, where it lodged. The neck of the bladder was perforated at two opposite points, and the urine insinuated itself into the scrotum, which swelled prodigiously, and fell into gangrene. Mr. Gallant, the surgeon, enlarged the wound by which the ball entered, and made an incision into the scrotum, where it had lodged. On the following day it was necessary to make deep scarifications of these parts, to arrest

the progress of the gangrene, and to assist nature in throwing off the slough; in the mean time he introduced a gum elastick sound into the bladder, which prevented the subsequent diffusion of urine. After fifteen days of suffering, he began to improve; the eschars separated, the posteriour wound soon closed, but that of the scrotum continued a long time open. When we returned to Egypt, a urinary fistula still remained, but healed soon after this period.

Many other similar cases occurred in the different engagements which we have since had, and all the wounded recovered by the same treatment. General Bon alone died of a wound of this kind, because he would not permit the wounds to be dilated, nor a sound to be introduced into the bladder. The diffusion of urine soon produced a gangrene, which was promoted by the corpulency of the general.

I shall briefly describe the consequences of this species of wounds, and the treatment proper for them.

During the first twenty four hours after gun-shot wounds of the bladder, but little urine escapes on account of the tumefaction which immediately takes place in the lips of the wound. When the bladder is full, it runs out only at the time of the injury, and through the wound whence the ball made its exit. The escape of urine is prevented by the thick eschar that fills the course of the wound, and it is not until this separates, that the diffusion takes place. It is then of the first importance that a gum elastick tube, that will completely fill the urethra, should be introduced into the bladder, and kept there: for the moment that the slough comes away, if the urine have not a ready exit through the natural channel, it will run into the wounds in proportion as the cellular membrane is exposed by the sloughs: hence fol-

low gangrene and death, as was the case with general Bon.

After having well dilated the wounds to facilitate the discharge of the urine that may follow the ball, a large gum elastick tube or catheter should be introduced and kept in the bladder, taking care to change it every second or third day to prevent its incrustation: emollient enemata, and cooling drinks, slightly acidulated, must be prescribed, while the patient will be kept on a rigid regimen, and in a state of perfect rest. The dressings should be simple, but according to art.

It remains that I speak of wounds of the limbs and the manner in which I treated them.

Of gun-shot wounds that injured the shoulder-joint, or the superiour part of the arm, by fracturing it or destroying its substance: and of wounds of the inferiour part of the arm, or fore-arm, with sphacelus, we had nineteen cases that required amputation at the scapulo-humeral articulation. This operation completely succeeded in thirteen cases; the other six died of the plague, or of the shock produced by the balls on the internal organs.

The nature of these wounds required a variety of treatment; nor could I adopt one uniform mode of operating in all cases where it was required. In some, the wound extended across the superiour extremity of the arm, and was complicated with fracture of the bone and destruction of the soft parts. In such cases the plan of Lafaye appeared most suitable; indeed it would have been impossible to make a flap before and behind, according to my method, when the parts had been destroyed by the wounding cause: and on the contrary, I could not practise Lafaye's method, where the deltoid muscle had been shot off, or when, in other words, the joint of the shoulder had been disorganized.

General Fugieres was an example of the latter. The ball had struck the shoulder across, from before, backwards: the integuments, the deltoid muscle, and a portion of the acromion had been carried away, the head of the humerus fractured, the axillary artery, several nerves, and the tendons surrounding the joint were broken, so that the arm, which was now cold, was supported but by a portion of the integuments of the axilla, and the tendons of the latissimus dorsi and teres major. Such was the wound when the general was brought from the heat of the battle to the *ambulance* of the centre, in the rear of the line. The shock of the ball, and the large quantity of blood that he had lost on the spot, reduced him to a very critical state: his countenance was pale, his pulse scarcely perceptible, und he felt such an agony that I feared he would die instantly.

I saw no safety but in immediately operating. I made two parts of flaps; the one behind, of the latissimus dorsi, the teres major, and skin: the one before, smaller and shorter, of a portion of the pectoralis and surrounding integuments that had escaped the ball. The artery had retracted itself under the pectoral muscles, but still poured out blood in proportion to the motion of the patient; so that I had to cut the mass of these muscles to find and tie it near the clavicle. The wound in consequence of the operation was now very large. I drew the edges as near together as possible, and a portion of them afterwards gangrened from the violent contusion they had undergone.

On the day after the battle, I went with the general to Alexandria, and attended him until the sloughs separated, and the total cessation of the first symptoms. At this time I again approximated the edges of the wounds by means of a uniting bandage applied on the extent of the wound alone. This assisted cicatrization, and probably

forwarded the cure, which was complete in two months. The cicatrix was effected by a great distension of the integuments, and their adhesion to the cavity of the scapula. Still the general experienced painful twitching and unpleasant pricking in this joint, that I attributed to the tension of the nervous filaments, and to the obstruction of the circulation in the vascular system of the cicatrix.

Three other wounds received at the blockade of Alexandria and siege of Acre, presented nearly the same phenomena, and were also cured in like manner. In several cases, the loss of parts was confined to the inferiour portion of the shoulder-joint, so as to leave a sufficiency of soft parts to form an anteriour and posteriour flap; and I operated after the manner of Desault, with this difference, that instead of beginning with the anteriour flap, I first formed the posteriour. The head of the humerus is indeed more difficult to disjoint outwards: but we avoid the hæmorrhage which sometimes happens by beginning with the anteriour flap, which perhaps cannot be prevented or arrested, when assistants are not at hand, as often happens in an army. Where the necessary assistants can be had, Desault's plan would be preferable.

I operate in the following manner: after having made the posteriour flap, I cut the capsule and the tendons that surround the joint from behind forwards, moving the arm forwards and downwards; I then lay hold with one hand on the parts, with which I form the anteriour flap, and especially on the axillary artery, to prevent the loss of blood; I pass the knife behind the head of the bone, and always finish the flap by directing the edge of the knife on the side of the humerus, so as to avoid cutting the axillary artery too high, and to leave it of a convenient length for the application of a ligature. The mameluke of Mourad Bey, and many other wounded men,

were operated on in this manner. The cicatrix soon formed, and the cure was complete before the thirtieth day.

When the superiour extremity of the humerus is fractured, it is not always necessary to amputate at the joint. If the injury be confined to the bone, and if there be no destruction of the principal muscles or tendons and large vessels, it will be sufficient to extract the foreign bodies. I am aware that such cases have been considered by authors sufficient to require extirpation of the arm: but I thought proper to differ from them on this point in the case of a man who was wounded at the taking of Spire, in 1792. The head of the humerus had been fractured by a ball, and the soft parts had scarcely been cut, although the ball passed through the shoulder-joint; after dilating the wounds, I extracted the fragments of the head of the humerus. This man was cured, and had the arm united by anchilosis.

The exsection of the head of the humerus has been proposed by some respectable authors to avoid extirpation of the arm. Mr. Parck was the first who performed it in England; and it has been since done by his countryman, Mr. White, and by Monsieur Vigaroux at Montpellier.

Mr. Sabatier has attended particularly to the operation of cutting off the head of the humerus, as he informs us in a memoir that he has presented to the institute, in which he describes the manner of performing the operation.

Professour Chaussier has attracted the attention of practitioners, by the successful result of his experiments on living animals. He cut off the head of the humerus and femur. We might, nevertheless, reply to this success of M. Chaussier, that the human body being very complex in its structure, we should not reason concerning the dis-

cases of man from those of quadrupeds, or judge of the treatment of one, from that of the other. For example, the two great trunks of the carotids of the dogs, on which he made his experiments, were tied without great danger; and we can also arrest the hæmorrhage of a large vessel in these animals, by the effusion of cold water. But I shall not dilate on the *excision* of the head of the humerus, as I have never found it necessary to perform it. Suffice it, that I have explained the difference between this operation, and the *extraction* of the head of the humerus, when separated from its cervix, by a fracture, or reduced to fragments.

Diseases and accidents may frequently happen, which render the extraction of the head of the humerus necessary: yet we have never had but two well-attested cases of this operation. The first may be found in the memoirs of the academy of surgery, by Boucher, who extracted many pieces of the bones of the joint, both of the humerus and scapula. The second case is given by Thomas, a surgeon of Pezenas. The operation was performed on a little girl of four years old, for an abscess complicated with caries, the consequence of the small pox. Nature had already commenced the operation, by discharging through the opening of the abscess, a portion of the body of the humerus, deprived of periostieum: the separation of the osseous piece was spontaneous, and the surgeon had but to extract the head of the bone, which, being as yet an epiphysis, had not followed the portion of the body of the bone: this case was completely successful. I may remark, that its extraction by pieces, has been only attempted in chronick diseases; such as deep caries of the humerus, and scrofulous exostosis. My object is to prove that this operation is rendered necessary immediately after shot have fractured the head of the humerus,

and to point out a mode in which I have succeeded, and the one which to me appears most simple.

It sometimes happens that a ball from a short distance, strikes the humerus below its head, and breaks the bone. The injury in all its extent is not apparent; two narrow openings only appear, and the joint of the shoulder retains its shape, because the head of the humerus remains untouched, or the fragments being close together, and applied against the cavity of the scapula, still fill it up. Yet, there is a means of discovering the disorder of the joint: for if the fingers be applied between the two wounds, a deep chasm may be felt, a want of continuity in the bone, from the retention of its head in the glenoid cavity, and the distance of the body of the humerus, which, by its weight, turns a little, and hangs down.

In such a case, it would be useless to dilate either of the wounds, as they could not be sufficiently enlarged to allow us to seize the head of the bone, and extract it

But the presence of the head of the humerus acting, as an extraneous body, since it no longer retains its relation to, and contact with the body of the humerus, irritates the parts and inflames the joint. Abscesses and deep caries soon take place, and no other resource remains but the extirpation of the arm.

I twice had the good fortune to prevent these consequences, and to avoid amputation that otherwise must have been necessary, by extracting the entire head of the humerus, or its fragments immediately, in the following manner:

I make an incision in the centre of the deltoid muscle, parallel with its fibres, and extend it as low as possible. I turn aside the edges of the wound to lay bare the joint, the capsule of which is generally open, and by means of a probe-pointed curved bistoury, with the greatest care, I cut the insertions of the tendons of the supra-

spinatus, infra-spinatus, teres minor, and subscapularis muscles, and the long head of the biceps. I then disengage the head of the bone, and turn it out through the new opening of the deltoid, by means of the fingers, or an elevator introduced through one of the lateral wounds. I elevate the humerus to the joint, and fix it in a convenient position by means of a sling and retaining bandage. Such is the plan that I adopted in ten cases, to effect extirpation of the head of the humerus. One of this number died of the hospital fever, two of the scurvy at Alexandria, and a fourth of the plague, after he he had recovered and returned to Syria: the remainder returned to France in good health: the humerus grew fast to the scapula in some of them, and in others, there was a species of accidental joint that admitted of motion.

A portion of the fractured bone must exfoliate. In order to assist nature in her operations, and to prevent caries of the medullary cavity, the incision should extend to the lowest part of the injured bone, to prevent the accumulation of matter, and to prevent fistulas. The dressings should be drawn together with great care and delicacy: for the suppuration which succeeds is generally very copious, acrid, and ichorous, and irritates and inflames the parts. In the early stage of the treatment, emollient fomentations and cataplasms are proper.—When exfoliation has taken place, the humerus is to be put in contact with the scapula, the glenoid cavity of which is now obliterated: the swelling that takes place in the cartilage, disposes the scapula to unite with the body of the humerus, and to produce anchylosis;* but if

* It is still doubtful whether bone can unite with cartilage, if their surfaces be kept in contact. It is more generally admitted, I believe, that the cartilage is absorbed before the end of the humerus becomes united to the glenoid cavity.—Tr.

exfoliation be slow, adhesion does not take place, and then there is a kind of joint formed that lessens the power of the limb. After the above topical applications have been used, wine, sweetened with honey, and gently compressing bandages may be applied.

This operation should be performed as soon as possible: it prevents irritation of the parts, and subsequent inflammation, abscesses, fistulas, and deep caries of the humerus, which make it necessary to resort finally to amputation of the arm.

CASE FIRST.

John Ficher, a grenadier of the 69th demi-brigade, at the siege of Alexandria, was wounded by a ball in his left arm, that entered about three centimetres from the cavicle, near the axilla, passed through a part of the pectoralis major, and the coraco-brachialis, and fractured the humerus below its tuberosities. There were also some splinters in the body of this bone, the head of which remained uninjured, and untouched, and still attached to the tendons of the scapula. The ball made its exit on the opposite side, and in its course cut the circumflex arteries, which poured out a considerable quantity of blood: so that the patient was much weakened.

After having examined the injury, I dilated the entrance and exit of the ball to a considerable depth, but not being able to disjoint the head of the humerus, through them I resolved to make a longitudinal incision through the middle of the deltoid muscle, at the most prominent part of the joint. I raised the arm, separated the edges of the incision, and with a probe-pointed bistoury, with a circular sweep, I cut the ligaments and tendons that surround the joint; then I removed the head of the humerus through the opening, and took care to dispose of

all the splinters. I brought the arm up to the shoulder, and left the patient to the care of Mr. Masclet, surgeon of the first class, who cured him in sixty days. The fractured portion of the os humeri exfoliated, and the bone formed adhesions with the scapula.

The following case is more remarkable than the last, on account of the nature of the wound, and its favourable termination.

At the battle of the Pyramids, John Gavel, aged seventeen years, a drummer in the 32d demi-brigade, was wounded in his right shoulder as he was beating the charge, by a 4lb. shot, which describing a parabola, turned all the shoulder-joint from before backwards: but as the curvilinear had succeeded the rectilinear motion of the ball, it passed over this round surface, while turning on its axis; so that the skin, being very elastick, yielded to its force and was not broken, except at the angle of the acromion; but the head of the humerus, the humeral end of the clavicle, the acromion and coracoid process were fractured, and a large portion of the deltoid muscle was destroyed. Notwithstanding the tattered condition of the parts, I had some expectation of saving the limb. The axillary vessels, the nerves and tendons of the hollow of the axillæ were unhurt. I found it easy, by making some incisions, to extract the acromion and the humeral end of the clavicle that was already displaced. The extraction of the head of the humerus was more difficult, on account of the tendons which retained it firmly in the glenoid cavity. The operation was interrupted by no accident, and he bore it well. During the first fifteen days, he was in much danger. To a considerable tumifaction, with pain and redness of the skin, fever, and loss of sleep, &c. succeeded a copious suppuration of a laudable appearance, a subsidence of the parts, tranquillity and sleep: the part of the humerus that was killed by

the ball, exfoliated, as afterwards did the spine of the scapula, and the glenoid cavity. The wounds soon healed, and the arm grew to the shoulder, by gradually drawing them together. This young man finally recovered, and was entirely cured when the convoy under commissary Sucy sailed with the invalids from Egypt to France, whither he also went with it.

Lafargue, of the 32d demi-brigade, at the third assault of Acre, was wounded by a ball, similar to that in the first case. I pursued the same plan in extracting the head of the humerus, and the patient was cured in the same space of time: but his shoulder never anchylosed with the arm, but formed a kind of joint that admitted of slight movements in various directions. I may remark that this soldier had less strength in his hand and fore-arm, than others in whom anchylosis had taken place. At the first battle of Aboukir, I saw a similar case, and treated it in the same manner.

I will not detail seven other cases that differed but little from the first three.

But I will relate the consequences of an amputation of the thigh at the hip joint. I performed this operation three times: once in the army of the Rhine, when I had the superintendence of the *flying ambulances*, and twice in Egypt.

In the first case, the operation was performed as usual, and the patient had passed several hours so well, that we were led to expect a fortunate result; but a forced march of a night and a day, during the severity of winter, and the fatigue and inconvenience of travelling, were probably the causes of his death.

Before I report the other two cases, I shall attempt to establish the possibility of this operation, and show the necessity for performing it in certain cases, and shall also give my mode of operating.

It matters not how severe an operation may be: it is an act of humanity in the hands of a surgeon, by which he may save those who are in danger; and in proportion to the degree and pressure of danger, should the aid of art be prompt and energetick. "*Ad extremos morbos extrema remedia exquisite optima.*"—HIPPOCRAT.—In such circumstances, the surgeon does his duty and thinks nothing of reputation.

The uncommon success that attended the amputation of both thighs of one man, of both legs, of both arms, and of an arm at the shoulder-joint in others, were sufficient to encourage me to undertake the extirpation of the thigh. The academy of Paris had called the attention of the surgeons of Europe to this operation, by the prize-medal that was offered on this important point of surgery, about the middle of the last century. The majority of the members of this enlightened body were in favour of the operation. But there is not a single example of its success, when performed for such causes as gun-shot wounds. The cases that we find in authors, of this operation, were all in consequence of chronick diseases, such as caries of the head of the femur, spina ventosa, and gangrene of the limb.

The frightful appearance of the wound, the difficulty of detaching the thigh-bone from the acetabulum, the danger of the retraction of the flexor muscles, and from sudden loss of blood, without doubt, have prevented army-surgeons from performing this operation, although they have certainly seen more than one case in which it was necessary.

To all these objections we may reply:

1st. The size of the wound is more alarming than dangerous. The cesarien operation on the living female, has been performed with success, and is now advised by many practitioners. The chief surgeon of the hospital at

Rouen, Aumonier, has successfully extirpated a scirrhus ovarium of considerable size. There are cases where the scapula, with the arm, has been torn off, and the persons have soon recovered. Besides, the surgeon will diminish the size of the wound from this operation, more than one half. The case of Mr. Pelletan confirms my opinion. This celebrated surgeon having performed the operation for aneurism of the axillary artery, without success, far from being discouraged, had drawings taken of the tumour, the anatomical parts, and the manner in which he operated. The drawings were placed in the museum of the school of medicine, to elicit the genius of the art, to direct his conduct, and to show the world that the disease is more terrible than the operation.

2d. The difficulty of the manual part of the operation, especially the disjunction of the head of the femur, is lessened by the plan I propose. I submit it to the judgment of my colleagues.

3d. The retraction of the muscles is exaggerated. In the operations that I have performed, it seemed to be of no consequence; at least there was no disposition in the muscles to retract to the apertures of the abdomen. My plan provides also against this inconvenience.

4th. Dangerous hæmorrhage is prevented by means of speedy pressure by intelligent assistants, on the months of the divided vessels, and the immediate application of ligatures. These ligatures arrest the blood more easily and more effectually, than those which include the flesh and cellular substance around the arteries. As to the loss of blood, we have nothing to fear from it, although practitioners have considered it as a fatal consequence of this operation. I hope to prove in my memoir on amputation, which shall be inserted after the campaign of Austerlitz, that there is no ground for such a fear.

I shall cite a case which is given in the works of Mr. Morand, p. 183, to support my opinion of the practicability of the amputation of the thigh at its superiour articulation. This author speaks of a soldier who had both legs cut off high up, and both his arms so near the shoulder, that he could hold nothing in his arm-pits. Yet he enjoyed good health. I refer also to the case of Samuel Wood, whose shoulder was torn off. In the course of this work, and particularly in the memoir on amputation, will be found the examples that we have already announced, of cures without internal disease, after amputation of the whole limb, or of the larger half of both superiour or inferiour extremities in the same person.

Without leaving the subject of gun-shot wounds, I have found extirpation of the thigh indicated under three different stages of such wounds.

The first is when the limb is disorganized, or carried away by a ball or the bursting of a bomb, so near the superiour articulation, that it would be impossible to amputate in its substance.

The arguments that I have adduced in my memoir, in the first and second cases, requiring amputation, will also apply here.

A shot from a *biscayen*, or a ball of large size, that fractures the femur at its superiour extremity, near the trochanters, breaks the crural artery or destroys the sciatick nerve, produces a second case, requiring amputation at the hip-joint.

The third is when the leg and thigh being violently bruised in the soft parts, is threatened or attacked with sphacelus, very near the superiour articulation, as I have sometimes seen.

Practitioners who have proposed extirpation of the thigh, have not agreed as to the manner of performing

it: while most of them fearing hæmorrhage from the femoral artery, begin by applying a ligature on this vessel, then form a flap of the glutei muscles, uncover the posteriour part of the articulation, open the capsule, cut the inter-articulary ligament, and finish the operation by forming the internal flap.*

This mode is very painful, difficult, and dangerous. The hæmorrhage which arises from the gluteal arteries, and from the sciatick and circumflex, is very difficult to stop while the limb is in place. The bone is disjointed with great difficulty, and there is a risk of breaking the ligature from the femoral artery, by the different positions that the patient is obliged to take, or even in passing the knife from the cotyloid cavity, to the origin of the triceps adductor, the arterial trunk may be wounded above the ligature, notwithstanding the greatest care in applying it near the crural arch. There are other disadvantages that it is unnecessary to detail.

To execute my plan, I place the patient on the foot of his bed, in a position almost horizontal, and fix myself on the inside of the thigh, intended to be operated on: a strong and intelligent assistant compresses the femoral artery, where it passes out at the crural arch. I then make an incision in the teguments of the groin, on the course of the femoral vessels, which I uncover; I dissect with caution, and after having isolated the great nerve which lays outwardly, I pass between it and the artery, a blunt curved needle,† to include both the artery and vein, and tie them together. I take care to carry up this ligature immediately, under the crural arch; to place it above the origin of the arteria profunda femoris: be-

* See the work of Mr. Morand, p. 189, memoir of Mr. Volher.

† Like those described in a former part of this work.

cause without this precaution a fatal hæmorrhage might take place from cutting it, during the operation. Having fixed this ligature and made it safe, I plunge my narrow knife perpendicularly between the tendons of the muscles which are inserted into the trochanter minor, and the bottom of the neck of the femur, so as to bring its point out at the part diametrically opposite, and directing the knife obliquely inwards and downwards, I cut at one stroke, all the parts which are to form the internal flap, which need not be made too large. I direct this flap to be turned towards the scrotum by an assistant, and immediately lay bare the articulation. The obturator artery, and some branches of the pudick are divided by this cut, and I secure them by ligatures. A single cut of the bistoury is sufficient to divide the capsular ligament, and by a simple abduction of the thigh, the head of the femur is almost luxated. The inter-articularis ligament appears, and may be easily divided with the same bistoury. I then take a small narrow knife with which I make the external and posteriour flap, by passing its cutting edge between the bony ring of the acetabulum and the great trochanter, and I finish the flap by an incision directed downwards and backwards, nearly on a level with this eminence, so as to leave the flap of a roundish form. The assistant who holds the flap, stops the mouths of the open arteries, until they are tied in succession. They should all be tied, even to the *smallest*, to prevent subsequent hæmorrhage, and to promote the union of the flaps. If the parts of which they are made be not irritated, some interrupted sutures may be made with the needles of which I spoke. But the muscles should not be touched; it is sufficient to include in the suture, the skin and adipose membrane: the flaps should be kept in contact by graduated compresses, wet with red wine, and by a neat retentive bandage.

This operation is soon performed, and to me has always been easy. I had laid down this plan before I went into the army, and the trials of it that I had made on the dead subject, and on animals, led me to expect a successful termination.

The surgeon should then direct his attention to the general state of the patient: venæsection, if the least appearance of plethora exist, cooling medicines, antispasmodicks, rest, and regimen should not be neglected. By these means the symptoms are prevented, which generally follow great operations, as amputation, &c. The adhesion of the flaps soon takes place, and suppuration is only established on those parts that have been killed, or severely bruised by the wounding cause.

The following observations appear to me to throw light on the question that has occupied the attention of the academicians, without deciding it: and the success that resulted, although not complete, has convinced me that my attempts will tend to the advancement of surgery. Practitioners should view the operation that I propose, as one by which they may snatch from the hand of death, those who have been hitherto abandoned to their fate.

The second person on whom I found it necessary to perform this operation, was an officer of the 18th demi-brigade, named Bonhomme, who was brought to me from the trenches of St. Jean d'Acre, with an enormous wound of the right thigh, from the bursting of a bomb.

A great part of the muscles that form the circumference of the thigh were lacerated, or carried away: the femoral artery was broken about five or six fingers' breadth below the crural arch, and the femur was fractured at the great trochanter. He had lost much blood, and was considerably reduced: I was of the opinion that unless the thigh were extirpated immediately, he

could survive but a short time. I operated without delay in the following manner:

I laid bare the crural artery, I passed two ligatures under it with the necessary precautions, and together with this artery, I tied also the crural vein. The internal flap, and the separation of the capular ligament were made with great ease: the bone was easily disjointed, and I completed the operation with the external flap.

In consequence of the regularity of the flaps, I had an exact union of them, and retained them easily in their relative situations by adhesive plasters, and a retentive bandage.

The patient during the remainder of this day and the succeeding night, was as calm as could be wished. I directed him to take some antispasmodick potions, put him on the use of cooling drinks and light soups, with a little wine. On the following day the dressings were imbued with a reddish serum, but there was neither swelling, pain, or tension of the stump. The night of the second day was well spent, and the patient had three hours of refreshing sleep. The third day I removed the first pieces of dressing to apply others; he passed the day well, his excretions were as usual, and without pain, and he demanded something to eat. I ordered him rice, morning and evening.

In the third or fourth night after the operation, he had a slight fever, attended with pulsation of the stump, and general heat, to which succeeded an abundant moisture, tranquillity and sleep. When I visited him in the morning, I found the dressings wet with a purulent serum.—The flaps had already united on half their surfaces, and left at their anteriour and posteriour junctions an opening, about five centimetres, through which the ligatures were hanging. I dressed the wound according to art, and renewed the bandage.

The fifth day every thing was in the best possible state; suppuration had taken place in the two small wounds that remained, and was laudable. The sixth day his appearance was still more favourable, and led us to expect his recovery: but the want of room in the hospital, and the impossibility of keeping even those who had the most serious wounds in separate beds, produced the unfavourable termination which took place on the following night. Our straitened situation did not enable us to remedy these inconveniences.

A soldier who had nursed the plague several days in his tent, was wounded in the leg by a shot, as he was going from camp to the hospital. Although he was very ill of the plague, this accident caused him to be placed, without my knowledge, in the ward among the wounded, where he was laid at the side of this officer, on the same division of straw, and communicated the disease to him, as appeared on the night of the sixth or seventh day. Next day the wound of the stump was attacked with gangrene, and its progress was so rapid, that our hopes were soon destroyed, together with his life.

The subject of the last case was a young man of twenty-five years of age, a drummer of the second demi-brigade He had his right thigh carried away, about its middle, at the last assault on Acre, by the bursting of a bomb. The fracture of the femur extended to the joint, and the flesh was torn and disorganized. He felt the most acute pain, although, at the moment of the injury, he bled until he was much weakened. He expressed his pain by violent cries.* I immediately commenced the

* I have remarked that all such large wounds are followed a few moments after the accident, by the most acute pains, and by violent twitc ings, which in a short time terminate in convulsions and death. Hence the necessity of immediately cutting off the broken bones and ragged flesh; after

operation for extirpation of the thigh, as in the former case: this young man being more corpulent, I was obliged to make some sutures to keep the flaps in their place, and to prevent their separation. Long compresses were placed crucially over the stump, and the whole supported by a suitable bandage. The operation was speedily finished, without loss of blood, and in a few moments the patient became calm, and slept soundly for several hours. The movement of the army towards Egypt immediately afterwards, made it necessary to carry him with the other wounded, and I afterwards heard that he died on the way.

Authors advise amputation of the thigh, when the leg is fractured at the knee-joint by a ball; this direction will not hold good in fractures of the tibia, for experience shows that even when the fibula is fractured at its articulation with the condyle of the tibia, provided the latter be unhurt at its superiour extremity, and at the insertion of the tendon of the patella, the operation is still practicable on the leg: in such a case, after having sawed off the two bones even with the tuberosity, I make an incision outwardly, in the soft parts that cover the fibula, follow its direction, lay bare its articulation, separate it from the tibia, and extract it altogether. I have often performed this operation with complete success; it does not interfere with the process of nature in healing the stump, although the tibia may be cut through the thickest part of its condyles, neither does it retard the motion of the person when he has a wooden leg.—Mr. ———, captain of artillery, who was wounded at the battle of Aboukir, in 1801, presented such a case,

the operation, the wounded man becomes calm, and blesses the hand that has relieved him.

and he walked with as much ease as if the portion of the fibula had been left.*

Of Wounds made by the Arms of the Turks or Arabs.

The balls of the Turks and Arabs are armed with a pedicle of iron or copper, which is united with them when they are cast. This fibre of iron is about four millimetres thick, and three centimetres in length, and forms a part of the cartridge: sometimes it ties two balls together, and gives them a branching form: they are also rough, and of larger size than ours.

On account of this pedicle, these balls in their course make great destruction, and are more difficult to extract than those used by Europeans. This metallick fibre tears the soft parts, breaks the vessels, punctures the nerves, and fixes the ball firmly in the bones, more especially when it strikes a joint.

The symptoms of these wounds were different, but in general they were more severe than wounds caused by our fire-arms. Hæmorrhage was common after the Turkish balls, but rare after ours, which were also more easily extracted.

It was necessary here to fulfil other indications: first, to stop the hæmorrhage, then to prevent or remove the consequences of pain.

For the former it was necessary to make deep incisions, to uncover the vessels, to apply a ligature on them, and to cut entirely through the nerves and aponeurotick sheath that were punctured or lacerated by the tail of the ball: it was necessary even to extend the same incisions that we might extract these foreign bodies. I used the

* Mr. Guillier, surgeon of the first class, by his care and assiduity, contributed to the cure of this officer.

bullet-forceps here with success, but I was obliged to be very cautious to prevent additional injury of the soft parts by their introduction.

SECTION IX.

During the tranquillity that we enjoyed, I did not confine myself to an arrangement of the observations that I have detailed: I also collected a variety of information relative to the interesting country that we occupied, so that I can give some account of the origin and physical character of the Egyptians, their customs and general manners: of the practice of medicine and surgery among this people, and of the state of their mummies: and finally, of the division of seasons and of the climate of Egypt.

The inhabitants of Egypt may be divided, as Mr. Volney has observed, into four principal races, viz. the Mamelukes, the Turks or Turkomans, the Arabs, and the Kopts; Europeans may form a fifth, but I shall not speak of them.

The Mamelukes who now govern Egypt, established themselves in it about the tenth century. They descended from Mount Caucasus, and arrived in this country after having made incursions into Syria. This people, designated by the crusaders under the name which they now bear, are distinguished from the other inhabitants of Egypt, by their physical appearance, and their warlike character. They are all of a handsome size, and robust constitution: their figure is fine; they have an oval face, circular cranium, large forehead and eyes, the nose well set, straight, or slightly aquiline, the mouth moderately

large, and the chin slightly salient. Their hair, eye-lids, and brows, are brown or chesnut colour, and their skin of a rough white. The women from the same country, who are kept in the seraglios, are nearly similar in appearance; some of them are very handsome. The old men have their heads ornamented with turbans, and are remarkable for the beauty of their countenances, and the dazzling whiteness of their beards, that fall on their breasts. Mourad Bey was a perfect model of a fine person. The character of the mameluke is fierce and hardy, but not cruel. They are hospitable and generous. They never marry until they attain high rank; but are exclusively devoted to the art of war. I think they may justly be called the best horsemen in the world.

The second race is composed of the Turks who come from Turkey or Asiatick Tartary. Their appearance much resembles that of the Georgian and Circassian mamelukes, but their colour is like copper, their shape broader, and their cranium more circular: their eyes are smaller, their countenance dark and designing, their eyebrows black and frowning, and beard thin and black.—Their character is less sprightly and more cruel. They form a large portion of the population of Cairo, and are under the immediate orders of the pachas.

The third race is that of the Arabs, who may again be subdivided into three different races: the eastern Arabs from the borders of the Red Sea, or from Arabia; those from the west, or the Africans, originally from Mauritania, or the coasts of Africa; and the third, the Bedouin Arabs, or Scenites from the deserts.

The men of the first subdivision, who are the *fellahs*, or artisans and labourers of all Lower Egypt, are below the common stature, robust and athletick; their skins are hard, tanned, and almost black. They have copper-coloured and oval faces, with large circular foreheads, pro-

minent black eye-brows, and eyes of the same colour, though small, sunken, and shining; their noses are straight, of a moderate size, mouths well proportioned, with fine teeth as white as ivory. Their women are in some respects of superiour appearance: the graceful symmetry of their forms, the fine proportion of their hands and feet, and the loftiness of their port, strike the beholder with admiration.

The African Arabs resemble those of the east, in their shape, vivacity, and colour of the eyes; but in the shape of their noses, cheeks, and lips, they are like the inhabitants of the coast of Africa. Their character is the same as that of other Arabs. They are spread over Upper and Lower Egypt, and like the former, cultivate the earth or attend to manufactures.

The Bedouins, or the shepherd Arabs, are scattered by tribes over the portions of fertile land at the entrance of the deserts. They dwell in tents, which are removed at pleasure. In some respects they resemble the others; but their eyes are more shining, the features of the countenance less prominent, and their persons better, although less of stature. They are more athletick, though very lean, of an active disposition, and fierce appearance.—They are wicked, avaricious, deceitful vagabonds; they are good horsemen, and boast their dexterity with the spear and javelin. The manners and customs of all these Arabs are nearly similar: they rear camels and a valuable species of horses, and flocks of sheep.

The fourth class of the inhabitants of Egypt is formed of the Kopts, who are numerous at Cairo and Upper Egypt. They are, no doubt, the descendants of the real and ancient Egyptians. They retain their figure, their knowledge, language, manners, and customs; and have always directed or superintended the finances of the state. The origin of these ancient Egyptians appears to be lost

in the lapse of centuries. They were found at Said, long before Diocletian: Herodotus asserts, that they descended from the Ethiopians or Abyssinians. Every historian agrees with Herodotus on this head, and the inquiries that I instituted on the subject, have led me to embrace the same opinion; but it must be admitted that the countenances of the latter present particular traits, which are not discovered in the inhabitants of Egypt. All these Kopts have a yellowish smoke-coloured skin, bloated face, thick lips, high cheek-bones, the nose wide towards the point, and nearly straight, with dilated nostrils, eyelids slightly tumefied, beard and hair black, and moderately curled. But from these features, I do not conclude with Mr. Volney, that they are of the family of negroes in the interiour of Africa. The marks of the countenance are sufficient to prevent them from being confounded with Ethiopians. The African negroes have their teeth larger and more prominent; the alveolar arches wider, and less raised, their lips thicker and more pouting, and the mouth wider, their cheek-bones are less elevated, and their cheeks smaller; their eyes less brilliant, and more circular, and the hair more lanuginous.

The native of Abyssinia has large eyes of an agreeable aspect, inclined to the internal angle. His cheek-bones and zigomatick arches are more salient; the cheeks form a more regular triangle with the jaw and mouth; the lips are thick but not pouting as in negroes, the teeth are fine, well set, and less prominent, and the alveolar arches less extensive. The colour of the Abyssinians is by no means so black as that of the natives of the interiour of Africa; and this difference is common to almost all the Ethiopians, or men of colour, who dwell in the regions of Africa, about the sources of the Nile.

The last features that I have delineated as belonging to the Kopts or real ancient Egyptians, with some shades

of difference may be observed in the heads of Egyptian statues, especially in those of the sphinx. To confirm this fact, I collected a sufficient number of skulls in several cemeteries of the Kopts, which had been necessarily demolished for publick works: I compared them with the skulls of the other races, of which I had also made a collection,* and particularly with those of some Ethiopian negroes that I had procured, and I was convinced that the first two kinds were nearly similar in shape.

The visit that I made to the pyramids of Egypt, and to the caverns of Saccharra, enabled me to despoil a great number of mummies of their heads, which were similar to the former in the elevation of the cheek-bones and alveolar arches, in the dimensions of the nasal fossæ (an indication of the short flat nose) and of the prominence of the angles of the jaws. The peculiarities of the face cannot well be seen in the mummy when it is whole; they are diminished or obliterated by embalming: hence they who have examined the exteriour of their heads have fallen into an errour.

From the various points of resemblance that we have pointed out as common to the Abyssinians and Kopts, and the correspondence that has always and still continues to exist between them, in their customs, manners, and even in their cult, appear to me to prove clearly that they are really descended from the Abyssinians and Ethiopians. It is also very probable that the latter have descended from the Chaldeans: this opinion is stengthened by the physical and moral analogy of the two nations, and by the monuments of Egyptian shape that are found in the different regions of Asia. Further, it is natural to

* This numerous collection was left in my house at Cairo, with other articles of importance.

suppose, that the Ethiopians, at an early date, would follow the course of the Nile, and stop in the country that is fertilized by this river; and as settlements are made in succession, so also did this people extend gradually from Elephanta to Thebes, to Memphis, and to Heliopolis. The other cities below these last, were not built for a long time afterwards, under the Macedonians, the Greeks and Romans.

All the inhabitants of Egypt speak the Arabick, and nearly all live in the same manner, and with similar customs, though they profess different religions. The Europeans among them are Roman catholicks of various modifications, according to the classes of Turks, Egyptians properly so called, and Mussulmans. There are also some Jews.

The men shave their heads, and permit their beards to grow, and the mamelukes reserve their whiskers or mustachios. Both sexes pluck out or shave off the hair of the sexual organs. The women wear the hair of the head very long, and colour it with a permanent dye that does not injure it. This dye is made of the powder of *henne*, of torrified nut-galls, mixed with the finest olive oil, and a metallick preparation, of which zinc constitutes a part. After having pulverized these solid substances in their propertions, they mix them with strong vinegar, so as to make a paste that is applied on the hair, after having first washed it well with soap and water. This paste is permitted to dry while on, and is then removed with a comb, and the hair again washed: it assumes now a beautiful brown colour, of any shade they choose. The eye-lashes and eye-brows are dyed of the same colour by the same process, but of different shades. The women also dye the nails of their hands and feet with the tincture of *henne*. They consider it an ornament to have pendant breasts, and the young females

go frequently into the baths to make them relax: they are especially fond of warm bathing, and consider it as a recreation.

It may not be improper to speak of these baths, as they contribute much to the preservation of health, to the prevention and cure of many diseases, and to the prolongation of life.

I shall borrow the description of them from the eloquent Savary, but shall make some additions and alterations that are derived from observation, during my stay in Egypt.

The baths are situated in the most retired part of Cairo. You enter them by a narrow gate, which admits you through a long winding corridor, into a grand saloon that rises in the form of a rotunda, with an open cupola for the admission of light and air. Around its circumference is a large raised floor, covered with carpets, and divided by partitions where you leave your clothes. A jet of fresh water spouts from the middle of the saloon, and falls, in a fine shower, into a spacious marble basin. This apartment is very cool, and the Turks are fond of reposing here after bathing, to smoke, take coffee or sherbets. Here also the bath-keepers stand with every thing necessary for the service of the baths.

If you undress in this first saloon, you cover your head and loins with a napkin, put on sandals, and enter into a narrow passage, where you begin to feel the heat. The door is shut; at about twenty paces a second opens, and you pass through a small passage that forms a right angle with the former. The heat increases; they who fear to expose themselves suddenly to it, stop in a small marble hall, in front of the grand bath. This bath is a spacious vaulted apartment, paved, and adorned with marble and porphyry: it is surrounded by four arched cabinets or alcoves The arched roof of the great internal saloon, permits

light to enter through openings that are closed with thick glass, the transparence of which is destroyed by the vapour of the boiling water, and admits only a moderate and agreeable light. This apartment is filled with the vapour that constantly arises from a fountain and bason of hot water. With this vapour that is about 30 degrees of heat, are mixed the sweet smell of perfumes that are burnt there. You lie on fine mats, and rest your head on a little cushion, choosing at the same time the most agreeable postures, and you are enveloped in a cloud of mild odorous vapour that softens the skin and opens every pore.

After resting a few moments, an active servant washes you from head to foot with the foam of white scented soap. After the whole surface of the body is thus rubbed with soap, you are conveyed into marble tubs in the closets. They are filled with water of the same temperature as that in the first apartment.

Half an hour after, the same servant returns with a stuff-glove, and rubs every part of the body. By these frictions which are graduated according to the delicacy of the parts, the furfuraceous scales are taken from the skin, with the concretions that are formed in the cryptæ and epidermis: the skin becomes as soft and as smooth as silk. These frictions are performed on the expanded edge of the bathing tub, and the operation is finished by washing first with warm and then with cold water: for each of which there is a cock. After bathing, you are wrapped up in warm linen, and conducted to the exteriour apartment through winding avenues. This insensible change from warm to cold prevents any inconvenience. On the elevated floor is a bed prepared, and you have scarcely laid down before a new attendant comes, who presses every part of the body gently, distends the limbs, moves all the joints, makes them crack without

pain, and rasps off the epidermis and callosities of the feet with pumice stone: you are then left to your rest, and may smoke, or take coffee or sherbets, as inclination leads you.

Leaving a room where you were surrounded with a warm and moist vapour, where the perspiration dropped from every limb, and being transported into a spacious apartment open to the external air, the thorax dilates, and you breathe with ecstasy. You experience a general sensation of pleasure, the blood circulates with facility, and the functions of all the organs are performed with ease; you feel a degree of agility and vivacity hitherto unknown. It seems as if you were just born, and now for the first time know what it is to live. A lively consciousness of existence seems to be felt throughout the whole system. While you are resigned to the most agreeable sensations, the imagination wanders over the universe, and every where enjoys smiling prospects and perpetual happiness.

If life be nothing but a succession of ideas—the rapidity with which memory retraces them, and the vigour with which the mind pursues the extended chain, during the two hours of delicious calm which succeeds bathing, would lead us to believe, that in this period we had lived a number of years.

I have experienced in my own person these salutary and agreeable results from bathing. The baths are advantageous for herpetick, rheumatick, and gouty affections, and in cases of cramp or *tic doloreux*. I have seen the good effects of them, and I doubt not that this means, united with the good diet of the rich, and the salubrity of the climate for three-fourths of the year, contributes much to their longevity. In 1800, among those who were in easy circumstances at Cairo, were thirty-five of 100 years of age.

The women are passionately fond of bathing, and go to the baths at least twice a week, at a time when the men are absent. Indeed, the men are forbidden, under pain of death, to enter them while the women are there. Notwithstanding this prohibition, as I was intimately acquainted with one of the principal matrons of Cairo, who was a female physician, and proprietor of one of the grand baths, I procured admittance to them, and saw through a small opening, which communicated from her chamber with the grand baths, everything that was transacted by the women. I shall speak only of such things as may be made publick.

They set out from the seraglios elegantly dressed, covered with veils of black silk, mounted on fine asses, and supported on both sides by *coddans* or servants, who escort them to the door of the baths. They go one after another, preceded by two staff-men, who clear the way for the column, which is followed by two or three other Turks with pike-staves, who close the procession. After they have entered into the bath, the doors are locked: the slaves wait at the door with the asses until they return. These slaves are charged with the protection of this asylum. The women are attended by their own slaves, and are undressed in the first saloon, and then conducted into the baths where they are washed, enveloped in warm vapour, and perfumed with essences.—Their black hair is dressed, their eye-brows and eye-lids coloured, and the nails of the feet and hands dyed with the tincture of *henne;* this has a fine effect. Their feet and hands are remarkable for their whiteness, for their shape and diminutive size. After these operations they are covered with cloaks of white India muslin, and put on turbans of the same stuff. The vapour and water are diverted from the bathing-room, and a collation of the most delicious meats is served up. Towards the conclu-

sion of the repast, they converse freely, and relate the adventures of the seraglio, dispute with each other of their charms, and of the favours that they have received from the sultans. The *almees* or jugglers are introduced, and produce some bad musick, dance, show feats of activity, play cards, tricks of legerdemain, and whatever is required of them.

After partaking of these amusements, the ladies throw off their bathing dress, and resume their usual costume; they veil themselves, remount their asses, and with their slaves return in the same order to their dwellings.

These baths produce particular effects on women. Besides the cleanness, the elasticity, and whiteness they give the skin, they dispose to plumpness, improve the figure, and promote fruitfulness. I have seen several women of our army, who never had children in Europe, become pregnant in Egypt, after using these baths.

The bath-keepers or matrons serve as physicians to the Egyptian women, and produce abortion for them when they wish it. I am convinced that the means which they employ for this purpose is infallible. The secret to prevent conception, and to make women barren, is not so certain. They have also receipts to promote fecundity. They keep the partes muliebres of married women, and of courtezans, in a state of tone and vigour by means of a solution, which need not be mentioned, as it may be abused. They also know how to improve the growth of the mammæ of young girls, when they are slow in evolving, or imperfect.

The girls retain the hair of the pubis until the eve of marriage: they then repair to the bath. The matron prepares a liquid paste, which she applies on the pubis where there is any hair, and permits it to dry on:* they then

* This paste is thus composed:
R. Quick-lime, lviii grammes =

go into a warm bath, whence they come out depilous, without having experienced the least pain. After preparing themselves, they then repair to the bridegroom, and the marriage is consummated. The next day, the parents of the bride, with great ceremony, tie these exuviæ, made into small bunches, on the trunk of a sycamore, and at the same time put up prayers to heaven for the happiness and fecundity of the woman.

Marriages are concluded during the ramaddan, which is the carnival, and lent of the mussulmans. They pass the day in prayer and fasting, but from the setting to the rising of the sun, they are engaged in various and continued revels.

At the commencement and conclusion of this festival, which lasts forty days, are nocturnal processions by torch light. The grandees of Cairo appear mounted on their finest horses, and display their wealth.

The march of this immense and singular train is opened by slaves bearing flambeaux, or torches elevated on a pike, in which they burn aromatick wood. Then follows a detachment of janizaries, or mounted mamelukes, then a file of the servants of the dervices, dressed in the eastern costume, embroidered with gold or silver. On their head they wear a bonnet several feet high, adorned with precious stones or coloured crystals, and sometimes with small lanterns fixed in the middle of this species of mitre. The appearance and march of these men is imposing and magnificent: next follow the dervises themselves, covered with large cloaks in the eastern style, wearing felt bonnets of a conical form, about two feet in height. These priests cry, sing hymns to Mahomet, and practice the most dreadful grimaces and contortions

Orpiment (yellow sulphuret of arsenick) grammes xxxii.
= . pulverize them together, and sift them, add water, q. s. for a paste.

of face. The dervises are succeeded by a corps of musicians of both sexes, mounted on fine asses, elegantly caparisoned. These women are the *almees*, of whom we have spoken. They play on the tabour, and perform tricks.

The *sheiks*, the *ulemas*, and the grandees, are distinguished in the midst of the crowd by their richly-caparisoned horses. They are preceded by kettle-drums on camels, followed by led horses, covered with the most superb trappings. Finally, the different classes of workmen of Cairo march in order, and the janizaries bring up the rear.

The ceremony of circumcision among the rich, is equally curious as that of marriage.

The women always live separate from the men, and have rarely any intercourse with them. The harems or seraglios that I saw, were subjects of curiosity. When the women appear in publick, they are masked, and are as unwilling to uncover their faces, as any part of the body. The men alone resort to the temples, and assist at publick ceremonies.

The costume of the Egyptians is large and handsome, and suited to the climate.

The women are very fruitful, but their children are badly treated, and of a sickly complexion until they become adolescent. The young persons of both sexes marry as soon as inclination prompts them.

I shall not speak of the animals, birds, fish, &c. of Egypt, as Messrs. Geoffry and Savigny who accompanied us, have made immense collections in natural history, and will attend, no doubt, to this subject.

I shall only say a few words of the Egyptian mode of hatching eggs: this art appears to have originated with this ancient and industrious people. There is here such an immense consumption of chickens, that the means

used in Europe to replenish the poultry-yards, would be insufficient in this country. Before the season arrives, at which the hens begin to incubate, the Egyptians have many thousand chickens hatched. This process is conducted in a kind of kiln, which in Arabick is called *maharoux il katakite*. They are made of two pieces, the inferiour of which receives the eggs. It holds about three or four thousand. There is also a superiour piece, in which the fire is put: thus communicating a graduated heat to that containing the eggs. The heat varies from 28 to 32 degrees, Reaumur, but it appears that they never raise it above this degree. The eggs are thus gradually warmed, until the twentieth day; when the chickens are hatched. The delicate sense of feeling which the incubators possess, and long practice, supersede the necessity of the thermometer, of which they know nothing. From the nineteenth to the twentieth day, they move the eggs: the little chickens break the shell: and if they experience any difficulty in coming out, these men assist them with inconceivable address and dexterity. When hatched, they are all carried into a neighbouring chamber, nearly of equal temperature; they leave them there one or two days, and then sell them for a *para*, or about three centimes* a pair. When eggs are abundant, chickens are raised with the assistance of the hen. The establishments for artificial incubation are very common in Egypt, and may at present be computed at three hundred, that can hatch 2,500 chickens each. Leaving out the season of *khamsyn*, when they hatch none, each kiln could produce 20,000 chickens per annum. I doubt whether chickens could be so hatched in cold climates, on account of

* Centimes, one-hundredth of a franc.—Tr.

the difficulty of afterwards rearing them, and because the expenses of the fowls would overbalance the profits.*

Of the state of Medicine and Surgery among the Egyptians.

Notwithstanding the decay of the arts and sciences in Egypt, we still find in the hands of a particular class of men called *halayms*, (doctors) a number of active remedies for the treatment of some external diseases that have been perhaps too much neglected in Europe; such as moxa, dry cupping or scarifying, blistering-flies, fire, dry and oily frictions, and vapour baths. The application of these remedies, and the judicious precepts that these doctors have inherited from their ancestors, by immemorial tradition, prove the antiquity and utility of surgery: it also appears that this art was held in great veneration among the ancient Egyptians, since the earlier kings of this country practised it themselves. Indeed, their historians pretend that Apis and Athotis searched the intestines of the dead, to discover the causes of the extraordinary mechanism of the animal functions, and that Hermes, Iris, Osiris, and Esculapius himself, cured the effects of many severe diseases by fire and the knife. Others not less celebrated, knew how to extract the arrows that were thrown by barbarians, and to prevent or cure the violent symptoms that were always caused by their entrance into the sensible parts of the human body.

If we carefully examine the bas-reliefs, and the paintings on the ceilings, and inside walls of the temples of Tentyra, of Karnak, of Luxor, and of Medynet-Abou, we may be convinced that surgery was practised as an

* Vide, in the great work on Egypt, a memoir on the subject, by M. Rouyere.

art among the ancient Egyptians. We also know that Hierophilus and Erostratus rendered the school of Alexandria celebrated by their discoveries in anatomy, and by the success of their operations. It was under the reigns of the Pharos, Sesostrises, and the Ptolemies, that surgery appears to have attained to the same degree of perfection as the other arts.* Then appeared Rhases, Aboulkasis, Avicenna, Mesueh, Averroes, &c. physicians of Arabia, whose works we yet esteem. At present, their physicians attend to external diseases only. The Arabians treated gun-shot wounds, which were not known to their ancestors, by burning gunpowder on them.

The common people prescribe for themselves, when they have internal diseases, unless it be the plague, which a fatal prejudice causes them to abandon to nature. They always know how to oppose inflammation, by regimen, rest, cooling acidulated drinks, and slight scarifications, which they perform with a razor on the neck, temples, thorax and lumbar regions, or on the gastrocnemei muscles, according to the seat of the disease. Warm baths, enemata, anodynes, graduated and uniform compression over the whole surface of the body, &c. are also in use among them.

In intestinal and putrid diseases, they use sweetened tamarinds, and the infusion of cassia and senna, indigenous plants, which the inhabitants carefully cultivate in every part of Egypt.

In asthenick diseases, they make use of thearica, tincture of opium, coffee, warm baths, and exercise. By this plan, internal diseases often terminate favourably.

The Egyptian physicians use their medicines with but little preparation, in the form of powders, opiates, or in-

* Vide the History of Surgery by Dujardin.

fusions. Their only compound medicine is thearica, which is prepared with great solemnity. (See Prosper Alpinus.) The most common purge among the indigent class, is made by keeping water of the Nile, or milk, for several hours in an empty coloquintida apple, and the fluid thus acquires all its purgative properties.

The Egyptians have a great antipathy to emeticks and enemata, but they will of themselves take the latter, when very necessary, by means of a bladder and pipe.

They also make great use of opiates prepared in different modes as the disease or the state of health may require. Opium and spices form the basis of their remedies for restoring the tone of the system, and for dissipating melancholy and sorrow. Aromaticks are the principal ingredients used when they intend to promote the powers of generation and fecundity. Camphor with an emulsion of the cold seeds, is successfully given to prevent fecundity and the venereal appetite. They give it in large doses.

The hydrophobia, although more common in hot than temperate climates, is not known in Egypt, and the inhabitants assured us that it never had appeared in man or beast. Without doubt this is owing to the species of dogs* of this country, and the manner in which they live.

The dogs of this country are very inactive: they lie down all day in the shade, near the reservoirs of fresh water, and only move during the night. They copulate but once in a year. They are held in veneration by the Egyptians, are never killed, and are therefore very numerous. They are mild and peaceable, never fighting with each other. These causes may perhaps prevent madness among them.

* This species much resembles the fox in shape and habits. They say the male fox copulates with the female dog.

The camels, during the rutting season, are subject to a kind of madness, which is not contagious. They then discharge a copious, thick, white foam from the mouth, bellow continually during this period, refuse water, and even appear to dread it. They pursue man, and other animals, to bite them. They grow lean, their hair stands on end, and falls off: sometimes they have a fever, and if in this state they be irritated, they die in convulsions: their bite is, at this time, dangerous. Many of our men were maimed by such wounds, even when trifling, although the best means were used to arrest their consequences. The camel-drivers, to prevent such accidents, muzzle their camels during the rutting season, and watch them with great care.

The lues or syphilis, is found among all classes of the inhabitants of Egypt, and even in the harems. The Egyptians say they have had this disease among them from time immemorial. Indeed it appears certain, that it was known in the time of Moses: of this fact we have a number of proofs that I consider it unnecessary to adduce, but I would recommend to all young practitioners, the excellent work of doctor Swediaur on the history and treatment of syphilis. Among the women that I saw with this disease in the seraglios, some brought it from the place of their nativity, and others became infected with it in the harems. The Egyptians are of opinion that it is a disease sent from heaven, or caused by fright. They mistake its character, and consequently neglect it. They make use of sudorifick and bitter tisans, and sand-baths to cure it. These means alleviate the symptoms, and even banish those which are mild; but when the disease is general, constitutional, or chronick, the symptoms that succeed it increase in violence, and change their appearance by spreading, and assuming a dreadful character.

I have here in many cases, prescribed mercurial preparations internally. Mercurial frictions do not succeed so well, and are sometimes dangerous, as I before said.

The small pox is very common in Egypt, and appears to have prevailed there for a great number of centuries. Mr. Bruce thus speaks of its origin. The small pox first made its appearance at the siege of Mecca. This was in the 356th year of the Christian era, and 250 before Mahomet. The whole army of Abraha, the emperour of Abyssinia, was attacked by it. The priests made the soldiers of Abraha believe that a species of bird, known in Arabia by the name of *ababils*, that had been seen hovering over the army, had produced the disease, by letting a number of small stones fall on the soldiers while they were asleep.*

When the small pox is epidemick, the plague does not prevail, or its symptoms are very mild, as we had an opportunity of knowing in the years 1799, 1800, and 1801. Children and negro slaves are most obnoxious to the small pox, and die in great numbers. Still inoculation is known even at the source of the Nile, and has been in use a great length of time. This operation is called in Arabia *tikhlyseh el-gidry*. The matrons, says the same traveller in another chapter, perform this operation by placing a small lock of cotton on the pustules, while in a state of suppuration, and applying it to the arm of the child, having first washed and wiped it. This plan generally succeeds, but is not as safe as vaccination, because it always produces a contagious disease which may also be dangerous, as frequently happens from the season of the year, and other causes.

I regret that we knew nothing of the important discovery of Dr. Jenner, while we tarried in Egypt.

* There was probably a severe fall of hail, preceded by a violent storm, which is very uncommon in these regions.

External diseases, that require delicate operations; cutting for the stone, hernia, amputation, &c. are unknown to the Egyptian physicians at the present day. They who are affected by them, perish without assistance, or drag out a miserable existence. But the *hakims* cut off the prepuce of young boys to circumcise them, and the nymphæ, and the point of their junction in young females. The former operation has been performed from time immemorial among the eastern nations, and among many of the islanders of the Indian ocean. It was, no doubt, instituted for the sake of cleanliness, and to improve virility. But the exsection of the nymphæ of girls, tends to diminish venereal desire, is productive of no good, and should be regarded as an act of barbarity and cruelty. This is not the only operation that the jealousy of the Turks has invented. The cupidity of the slave-merchants leads them to use infibulation, and the suture of the parts.

There are some midwives in Egypt, but they are devoid of skill. They interrupt and retard the operations of nature during labour. They still make use of a kind of arm-chair mentioned by Moses, under the name of *Abenym*, (in Arabick, *koursy*) on which the ischia of the woman are placed when she is in labour: she is retained in this position by two women who assist the midwife. We can easily conceive that in this posture, which is very fatiguing to the mother, the child cannot accommodate itself to the axes of the pelvis; its head presses on the perineum, which retards its exit, and is finally lacerated, as I have had an opportunity of witnessing.

These matrons tie the umbilical cord, and after dividing it with a small knife, they bind it to the abdomen of the child, which they also wash, as in former times, with sea-water, or the fresh water of the Nile.

When labour is preternatural or tedious, they perform operations, which, according to their description of them, are similar to the abdominal and vaginal cesarien operations: a knowledge of these, they say, is derived from their ancestors. Hence we may infer that it was known to the ancient Egyptians: but I learned that in the hands of these matrons, it almost always proved fatal.*

The state of the mummies which are yet found in great quantities, in the catacombs of Upper and Lower Egypt, especially in the pyramids of Saccarrha, that I visited throughout their whole extent, and the manner in which these mummies are prepared, showed us that the ancient Egyptian surgeons, who embalmed, or caused it to be done, had a perfect knowledge of bandages: for these mummies are covered with dressings, applied in the most exact and methodical manner. It is also difficult to conceive how these physicians could embalm the different parts of the body with so much art, unless they had a knowledge of anatomy.

I discovered three kinds of mummies, which appeared to belong to three classes of citizens, or perhaps to different generations. Those of upper Egypt were more elegant, and in a better state of preservation than others found in Lower Egypt.

The mummies that I include in the first class, are firm, solid, covered with bitumen, embalmed with the same substance, and rolled in bandages of linen, that like surgical rollers are applied according to the regions of the human body. They are enveloped in a stuff like pasteboard, marked with hieroglyphicks, and the whole is

* Some time before I left Egypt, I commenced a course of midwifery for the instruction of the midwives, who were to have been sent into the principal places in Egypt, to practice this branch of our art more methodically.

kept in a case of sycamore, on the lid of which is painted the image of the individual.

It appears, according to Herodotus,* that after having evacuated the three principal cavities of the body, they were filled with bitumen; they also injected the limbs, after making incisions in them. This substance, in a state of perfect fusion, penetrates deeply into these parts, and even permeates the bones; so that the bodies may be preserved as long as the place where they are deposited can be kept dry, and the air excluded. Having removed the envelope of these mummies, you may distinguish their sex, and the shape of their body. The face, the hands, and the feet of some are covered with leaves of gold, artfully applied, and under their arms, or even in their body, are found the scarce writings on the *papyrus*, of which the characters are still unknown. Each of these mummies also has with it the emblems of the art or profession that the person cultivated during life. These utensils are enclosed in the coffin.

The first mode of embalming requires great and long-continued preparation, and many ingredients, which renders it expensive.

The mummies of the second kind are less elegant and less perfect. The external envelope was of a coarser cloth, and applied with less art. They had none of the pasteboard, and the sycamore coffin was not so well made, nor ornamented with paintings.

The third kind were not so well preserved, and the mode of embalming was different. All the mummies of this kind were prepared by injecting into the cavities saline and corrosive substances, or a strong solution of *natron*, or of sea-salt. After having thus completely im-

* Second volume of his history, p. 113, translation of Druyer, fol.

pregnated the body with these articles, they dried it thoroughly in the sun, or before the fire. They then enclosed it in a rough case of sycamore. All these operations were doubtless directed by surgeons.

The progress which anatomy and chemistry have made since the middle of the last century, has advanced the art of embalming to the highest degree of perfection. I have seen subjects of every age in the different anatomical cabinets, and especially in Germany, that were prepared without bitumen, so as to preserve their shape, their natural attitude, and even the colour of their skin. So I prepared the body of colonel Morlan, who fell at the battle of Austerlitz. Although it has been exposed to the action of the air and moisture, it is still in a perfect state of preservation.* The plan which I adopted, is founded upon chemical principles, and to me appears preferable to that of the Egyptians.

I will here describe it:

If the person whose body is to be embalmed have died of a chronick disease and marasmus, provided there be no suspicion of abscesses in the viscera, and if putrefaction have not commenced in the interiour or exteriour of the body, the viscera may be reserved in their respective cavities. The brain must always be extracted. Under these circumstances, you begin by washing the surface of the body with pure fresh water, and glysters of the same should be injected into the large intestines and their contents that cannot be discharged by their gravity, or by pressure on the abdomen, must be taken up with an empty syringe. The contents of the stomach must be removed in the same way. It will be proper to adapt an œsophagus tube to the pipe of the syringe which may be introduced into this viscus, through the mouth or an

* M. Ribes assisted me in embalming this body.

aperture in the œsophagus, or left side of the neck. This being accomplished, the stomach and intestines are to be filled with melted bitumen. The orifices are to be closed, and then we may proceed to inject the vascular system: for this purpose, cut up a triangular flap from the anterior left lateral part of the thorax, opposite the curve of the aorta: cut up one or two of the cartilages that cover the artery, and in it fix the pipe of a syringe, through which force a fine red injection, to fill the capillary vessels of the whole membranous system. A second and a coarser injection is to be made by the same means, to fill the arteries and their ramifications, and a third for the venous system, to be thrown in by the crural veins: the body will be suffered to cool, and the injections to harden. To evacuate the skull, apply the crown of a large trepan at the union of the sagittal and occipital sutures, after having made a longitudinal incision in the skin, without cutting off the hair, which should be preserved with that of the other parts of the body. Having made this opening, break the adhesions and folds of the dura mater, with a scalpel, and tear away this membrane with a blunt hook, and with it remove the cerebrum and cerebellum, and inject cold water, which soon dissolves the substance of the brain. The division of the integuments should be closed with a suture.

If the subject be corpulent or fleshy, and have died of a malignant disease, during a warm season, it will be impossible to preserve the intestines from putrefaction: in such a case, they must be extracted by a semilunar incision through the right side of the abdomen, towards the lumbar region: then detach the intestines, the stomach, the lives, the spleen, and the kidneys: cut out the diaphragm by a circular incision; then the mediastinum, the trachea and œsophagus at their entrance into the thorax, and remove the lungs and the heart without in-

jury: the latter should be preserved separate. Sponge out these cavities, and put a quantity of hyper-oxygenated muriate of mercury on their fleshy parietes: afterwards fill them with horsehair washed and dried. Give the abdomen its shape, and unite the two edges of the incision by suture. Finally, plunge the body, thus prepared, into a sufficient quantity of the strongest solution of hyper-oxygenated mercury: leave it in this liquor from 90 to 100 days: when it becomes completely saturated with this solution, place it on a hurdle, and submit it to a gradual heat in a dry and airy place. As the parts dry, give them their natural shape, and restore the shape to the features of the face, and place them in a suitable attitude. Put two eyes of enamel between the retracted ball of the eye, and the lids. Give the hair its proper colouring *if it* be necessary, and cover the surface of the body with a light-coloured varnish, that gives the skin an appearance of freshness and animation. Finally, put the body under glass to show it in publick, or keep it in a coffin. Thus for many thousand years may be preserved the remembrance and the image of heroes or great men.

My observations led me to divide the year in Egypt into four seasons. The first is when the Nile overflows about the middle of August, the time when the ancient Egyptians, according to Bruce, began their year. This also agrees with Herodotus. Other historians assure us that they dated their year from the summer solstice.

Without regarding the divisions of the ancient or modern Egyptians, I shall divide the seasons according to their influence upon the animal economy, and as the overflowing of the Nile produces a great change in the soil of Egypt and its inhabitants, I shall date my *constitutional* year from this period, about the 21st of August. From this time to the autumnal equinox, the inundation increases, and all Egypt is like a sea, in which

the towns and villages appear as so many islands, and the inhabitants communicate with each other by means of boats. Towards the end of September the waters retire, and as soon as the slimy earth, deposited by the Nile on the sandy plains of Egypt, is exposed, they sow clover, barley, and wheat, and continue to sow as the waters of the river retire.

I call this first season, which continues about three months, *the wet season:* it may be considered as the winter of this country. The west winds that then blow, increase the humidity of the atmosphere, and cause the mornings and evenings to be foggy. Hence an inconvenient moisture is felt, that effects the animal excretions. In this season prevail ophthalmias, miliary fevers, diarrhœas, and catarrhal affections.

The second, which I call *the fruitful season,* begins at the approach of the winter solstice, or about the middle of December, and continues until the 1st of March or harvest. At the beginning of this season, the winds which were at west, change to the east, and continue so with little variation, until the month of March. Although the nights are very cold, this season may be considered as the spring of Egypt, on account of the heat of the day, which is similar to that in Europe in the month of June, and on account of the state of vegetation, and the productions of the earth. The whole plain which was furrowed by the river, and during the summer presented an arid aspect, is covered with abundant verdure, spotted with villages and palm trees, and many odoriferous plants in full bloom. All nature seems to be re-animated and rendered fruitful by the river. The cattle and birds feel the influence of the season, and procreate their species. This period is healthful, if care be taken to guard against the coolness of the nights.

The third, which I shall designate as *the sickly season*, because more injurious to the health of the inhabitants, and more especially to strangers, begins about the 1st of March, and generally continues to the end of May. The east winds that prevail during the spring, change to the south some time before the equinox, and do not leave that quarter till the end of May, or beginning of June. The harvest which began at the end of spring, is finished at the beginning of this season. The south winds are then light, but they gradually increase, and afterwards diminish; for the space of about fifty days they are very violent and hot, and but for this intermission would be insupportable. They generally continue but three or four hours at once, and are called *khamsyn*. In the course of the summer, there are winds in the deserts that border on Egypt, of the nature of the *khamsyn*, and even more fatal; travellers call them the "*winds of samiel.*"* They often raise columns of sand and dust vertically, to the height of fifty or sixty feet, which falls with dreadful noise and explosion. We were twice almost overwhelmed by these columns. The *khamsyn* is very hot, from passing over the immense deserts which lie on the south of Egypt: besides this pernicious quality, these south winds are loaded with the putrid effluvia of animal and vegetable substances decomposed by the heat in the lakes that are formed by the subsidence of the Nile, or in the cemeteries that are affected by its inundation: hence the principal cause of pestilential diseases: the plague also prevails at this season. After the great inundation of 1801, it made the greatest ravages among the inhabitants of Cairo and Upper Egypt. At this season, also in 1800, the yellow fever prevailed and attacked our wounded, particularly at the siege of Cairo, while the plague scarce-

* See the travels of Dr. Olivier.

ly appeared, no doubt because the winds were less moist and less charged with miasmata during this year, than in those in which the plague made its appearance. I am led to believe that the atmosphere of Egypt, at this season of 1800, was analogous to that of St. Domingo. In the sickly season, wounds heal with difficulty, and fall into gangrene. All diseases then assume an ataxick character, require greater attention on the part of the physicians, and all living beings are generally unwell.

I distinguish the fourth season by the name of "*Etesian.*"* It commences at the middle of June, and continues until the overflowing of the Nile. The winds veer towards the north after varying some time, and continue in the west during the whole season. They are temperate and regular: rising and falling with the sun, but becoming daily more violent. These *etesian* winds, in crossing the Mediterranean, carry its vapours towards Ethiopia, where they collect, and are condensed, and fall in torrents of rain at the summer solstice, on the mountains of Abyssinia, and hence the gradual and periodical swelling of the Nile.

At this season the nights are cool, without being moist, but it is adviseable to guard against them. The heat is very great during the day, and would be intolerable, but for the breezes which moderate it. This heat is not so inconvenient as that which is sometimes experienced during midsummer in Europe. It produces an abundant perspiration which keeps the body of the same temperature, like a tepid bath. This sweat preserves the equilibrium of the functions, and prevents inflammation which might be produced by a dry and burning atmosphere. This is also the most healthy season of the year. At this time there is no disease prevalent, and the most

* Certain winds so called.

severe wounds heal in a surprising manner, and it is the most favourable time for caravans and troops to proceed into the interiour of Egypt.

In Egypt, the first crop needs no cultivation: but after that, the earth is prepared by different means,* and by irrigation, they produce many other crops during the summer, until the return of the inundation; especially near the mouths of the rivers, and along its banks. They here cultivate wheat, maize, sugar-cane, flax, rice, cotton, indigo, carthamum, &c. Coffee grows in Yemen, not far from Egypt.

I shall make a few remarks on the camel, the most useful animal in this country, on the horse, on the tetrodon, the palm-tree, and the *mimosa odorifera*.

The camel of this country, properly speaking, is a dromedary with but one bunch: of which there are but two species.

The first species is the larger and stronger in every respect. It is employed to carry heavy burthens, and is commonly called the camel.

The other is smaller, more delicate, its legs are much less than those of the first species; this is the dromedary. It is kept for travelling, and is generally used by the Arabs of the desert.

There are few animals devoted to the service of men, possessed of so many qualifications as this species of camel. The Arabs, by instruction, render them useful almost beyond belief. They are docile and attentive, evince an uncommon instinct, obey the orders of their drivers, kneel down to receive their load, that is placed on the greasy bunch of hair with which nature has so

* Their implements of agriculture are exactly similar to those of the ancient Egyptians. See the memoirs of M. Girard, member of the institute.

kindly provided them, then rise with ease and move off at command. They can only walk and trot, and although their motion is not very rapid, on account of their length of body and legs, they will travel a great distance in a short time without fatigue, say twenty-five or thirty leagues in a day; and seldom stop on the road.

With the second species of camel, the dromedary, the Arabs convey intelligence to each other with the utmost rapidity. From their example, we employed a number of these animals. A regiment of select soldiers was trained to mount them, and this kind of cavalry was very useful to the army. It performed the duties of couriers, and successfully fought the Arabs of the desert, that our common cavalry could not overtake. Their manœuvres were equally curious and rapid.

This animal can pass many days, continually marching in the desert, without food or drink. Before they set out, they eat plentifully of the kernels of dates, a hard and nourishing substance, which is with difficulty broken down by the first mastication: this they ruminate several times at long intervals, so that it nourishes them, keeps up the functions of the organs, and they do not appear to suffer from hunger.

By means of this rumination, we account for their powers of fasting. The appendage of the stomach in this animal, has the power of furnishing by secretion, a copious aqueous fluid, which lubricates their stomachs, and prevents the painful sensation of thirst. This secretion is more abundant when on a journey through the deserts, and during abstinence from food. I have taken notice of this difference, in opening some dromedaries that died from wounds, and from fatigue. Contrary to the opinion of some, I believe that they bend their legs spontaneously to lie down, while young, as when they have at-

tained their full growth. This then is not the result of instruction, but is natural to the animal. Of the camel's hair, the Arabs make different stuffs. The skin, the meat, and the milk, are used for different domestick uses: the meat is good and resembles beef, and the milk of the female is like that of the cow.

The agility and elegance of the Arabian horses are well known. They are also gentle and obedient: they are often kept in the same tent with the Arabs. The manner of shoeing these horses is singular. The farrier cuts the horn of the hoof from heel to toe: in France a contrary practice prevails. Here the shoe covers all the sole of the hoof, and prevents the animal from being pricked, or from being injured by the pressure of foreign bodies on the naked frush.

The Egyptians close their stables at night, to secure their horses from the cold and moisture, and keep them always open during the day. Experience has taught them that these precautions prevent the horses from being attacked by the endemick ophthalmia, to which they are as subject as man.

On our arrival at Cairo, we found in the houses of the rich, a great number of animals of various genera and species.

The tetrodon, (*tetraodon leneatus.* LIN.) is a fish, remarkable for having organs, which receive a portion of atmospherick air, that fills a membrano-muscular pouch placed under the belly, and communicates with its mouth by an opening at the epiglottis.

This fish has the power of expelling all the air from this pouch, and of filling it at pleasure. It would seem that it fills it only to attack its enemies, or to defend itself. Indeed, its skin is entirely covered with points, which are erect when this bladder is distended with air.

The tetrodon then floats on the surface of the Nile. But the pelican, which carefully avoids it, swallows other fish that appear to be more dangerous, from the points with which their back and fins are armed: but it is careful to swallow the head first, and thus to avoid being injured by the fins which incline towards the tail. If swallowed, the gastrick juice soon dissolves these fins, and renders them harmless.

The palm-tree and the sycamore are the most common and valuable trees in this country. The former furnishes the date, a very sweet nourishing fruit, that the Egyptians use variously prepared. Of it they make wine, brandy, and preserves in pasty, that are eaten while traversing the deserts. The leaves and stems of this tree serve for various purposes.

The sycamore is a handsome species of the ficus. Its branches are covered with foliage, and extend widely, affording an acceptable shade to the traveller. It produces a reddish fig of no value.

Mimosas are here various and numerous. The *mimosa Nilotica*, is especially worthy of notice. This tree produces a flower of a jonquil-coloured edge, that has a smell like a rose.

During the third year of our stay in Egypt, the appearance of the country was agreeably changed, and promised to recompense us for the fatigues and privations that we had undergone, and the sacrifices we had made to conquer it. But in the midst of our pleasures we were threatened by a sudden invasion of several hostile armies. On the south appeared an army of sepoys from the Red Sea: on the east the grand vizier with a considerable army, which extended to the colonies of Syria, and the frontiers of Egypt: on the north an English and Turkish fleet blockaded the port of Alexandria, and threatened a descent: and on the west the mamelukes

and the Arabs were prepared to join the strongest side, and profit by the plunder of the vanquished. General orders were issued, and the army prepared for a new campaign.

SECTION X.

A courier extraordinary from Alexandria, informed us, that an army of 20,000 English had effected a landing at Aboukir. Our troops at Alexandria had attacked the enemy on the shore, but the result was by no means fortunate for us; besides some killed, we had thirty soldiers wounded, who were conveyed to Alexandria. I shall notice them in the sequel, with those that were wounded in an engagement on the 13th of March, between this army and the two divisions of Lanusse and Friant.

The commander in chief united his forces, and marched on the 12th of March. I followed the army with five divisions of *flying ambulance*, after having given up my station at Cairo to M. Casabianca, surgeon general adjunct.

We crossed the fertile plains of the province of Bahhireh, which were then covered by an abundant harvest, almost ready for the sickle. At Rahhmanieh we had, for the first time since our stay in Egypt, a severe fall of hail, after a dreadful storm that we encountered on entering this city. While we remained here, we had some cases of the plague, which were cured in the lazaretto near this place, under the care of Dr. Sotira.

From Rahhmanieh, the army marched to Alexandria, by the lake Mareotis, to avoid the English, whose gunboats had come to the edge of lake Ma'dyeh, near the common road.

On the 19th of March the head-quarters of our army were established at Alexandria, after a forced march, and we soon received information from the general who commanded in the province, of the enemy's situation, and of the state of his intrenchments. In order to indulge the ardour of his troops, the general wished to lead them to battle as soon as possible, and the plan of the attack for the next day was decided on in a council of war, the same evening. During the twenty-four hours that preceded the battle, I was busily employed in directing the army-surgeons, and those of the navy who could be spared from it, in the preparation of a sufficient quantity of dressings, and of whatever appertained to the hospitals. Commissary Sartelon, who assisted me with so much zeal and activity during the siege of Alexandria, put in requisition bed-clothes, utensils, and whatever might be necessary for the assistance of the wounded. Having arranged these matters, and given them into the care of Mr. Mauban, during the night of the 20th and 21st of March, I repaired to camp to dispose the *ambulances* according to the order of march. Before day I returned to head-quarters, to accompany the commander in chief, and to direct the *ambulance* of the centre that I had fixed in the rear of the guides. I had distributed my light baskets of the *ambulances* through each division, to carry off the wounded as fast as possible, which were particularly useful.

The enemy, intrenched on the Roman line, were strengthened by the remains of the walls of Cæsar's camp, and the nature of the ground, and protected on the left by lake Ma'dyeh, and on the right by the sea. Redoubts, fortified with cannon, defended their principal positions: a fleet of gun-shallops flanked the wings of the army on the two lakes, and their camp was covered by the fleet that was anchored in the road of Aboukir.

On the 21st of March, at half past four in the morning, the signal of attack was given; our columns moved on with composure and firmness to the intrenchments of the English. The intrepidity and valour that our soldiers at first displayed, predicted a victory, and these brave fellows would no doubt have gained it, but for a series of unfortunate occurrences that took place during the battle, and disarranged the order of it, and arrested their impetuosity after they had obtained possession of a part of the enemy's intrenchments. General Roize was carrying terror into the most distant ranks of the enemy, when he was killed by a cannon-ball in the midst of his men. This misfortune obliged our cavalry to fall back, and the whole army soon retreated. We had thirteen hundred wounded in this engagement, which, added to the six hundred who were wounded in the affair of the 8th and 13th of March, filled our hospitals. A great proportion of these wounds were severe, and required important operations. Among the generals who were wounded were Lanusse, Baudot, Destaing, Sylly, Morangie and Boussart.

General Lanusse was shot in the right knee by a small ball: the articulating ends of the bones were shivered, the popliteal artery and nerve were broken, and the femur extensively fractured. The hæmorrhage was considerable, and the contusion violent I proposed to amputate at the thigh immediately, as the only means of saving his life, but he refused, saying, that he did not wish to survive this unfortunate day. But after suffering most violent anguish for eight hours, I was called by his friends to his assistance. Erethismus had already commenced, with singultus, anxiety, paleness of the face, icy coldness, and insensibility of the wounded limb: these, with the unfavourable state of the pulse, foretold that the operation could not now succeed. There was yet a chance,

for amputation might produce a calm and an alleviation of pain. It was performed in less than three minutes, but the vital powers were exhausted, and although a calm succeeded, he died in apparent tranquillity on the night of the 21st or 22d of March.

General Baudot was wounded at the same time, by a similar ball. The calf of his leg was carried away, and the bones were fractured. Amputation was equally necessary in his case, and should have been immediately performed, but he would not submit to it; he died of gangrene, after several days of dreadful torment.

These two cases, and the following, support the principles that I have established, in discussing the first question of my memoir on amputation.

General Sylly had the left leg almost entirely carried away at the knee-joint; it remained attached only by a few portions of ligament and tendon. He was carried to the *ambulance* of the centre, in the rear of the line of battle; but the extreme debility to which he was reduced by the loss of blood, deprived him of a knowledge of the extent of his wound: he did not even suspect the loss of his leg until after the operation, which was immediately performed, and almost without pain, on account of the torpor of the limb. Although he was more than sixty years of age, and the circumstances of the siege were critical, yet he recovered in a very short time, and with no other unpleasant consequence than a purulent fistula along the course of the femoral vessels, the result of the violent distension that they had undergone. Without this operation I am certain he must have died.

Generals Destaing, Morangie, and Boussart, were also wounded by balls of large size. The first was attacked by symptoms of tetanus. His case is detailed at the conclusion of the memoir on that disease; and the

case of general Morangie in my memoir on amputation.

In the case of general Boussart, a ball penetrated the parietes of the abdomen, in the region of the groin, and grazed the spermatick cord. Adjutant general Blaniac, chief of the etat-major of cavalry was also wounded in the breast by a ball. His ribs were fractured, but there was no organick lesion.

Almost every commander of a corps, and a great portion of the officers were wounded; some died immediately of their wounds which affected organs essential to life. The greater part of them were dressed, and had their operations performed on the field of battle, or immediately after they were conveyed to the hospitals of Alexandria. All that were amputated during the early part of that day, recovered speedily. I will relate the case of Duvilas, a captain of the 85th demi-brigade, to enforce the necessity of immediate amputation in cases of this nature. This captain obstinately refused to submit to amputation, because the surgeon who had dressed him had flattered him with a recovery without it: the surgeon had thought it sufficient to cut off some disorganized flaps that hung from the joint.

The first examination was favourable to the opinion of Bilguer and his supporters, for the bone appeared to be fractured transversely, and splintered. The contusion and laceration appeared to be confined to the injured parts; but when we had carried our researches further, and deliberated on the case, we were convinced that the portion of the limb which had escaped the immediate action of the ball, must be so much injured, that without the amputation of the bone below the fracture, and the removal of all the soft parts in which the circulation was destroyed, he must die, after enduring excessive pain.

It is true there have been cases in which a limb has been carried away; and cured without amputation; but can we establish a general rule on a few rare and favourable cases (among so many that have been unsuccessful) because extraordinary crises took place, on which a surgeon could never calculate?

Good surgeons well know that amputation and extirpation of a limb are by no means such simple operations as some have pretended, especially when they are performed on the field: a want of courage, and the fear of being taken unawares at the most critical juncture, might, perhaps, have led the partisan of Bilguer to adopt his opinion.

Besides, the wounded seldom survive more than a few hours after these gun-shot wounds; they die on the road or as they enter the hospital. But it is a disgrace to humanity, that the surgeon, who should be the true friend to the brave and wounded soldier, would not sacrifice his personal convenience to save him by an immediate amputation.

The 21st of March, 1801, and the ten succeeding days were days of labour to the surgeons, who were engaged night and day in dressing the wounded, that were distributed among the different hospitals of the city.

I received information shortly after, from Cairo, of the death of M. Casabianca, by the plague.

The enemy pursued his operations, and attempted to surround and shut us up in Alexandria. For this purpose he marched the main body of his army towards Rahhmanieh and Cairo. At the same time the Osmalins, the Sepoys, and the Arabs of the deserts, followed the march of the enemy, penetrated into the interiour of Egypt, and drew near the capitol, which they invested, in a few days, in conjunction with the English. The division of Belliard was thus obliged to capitulate, on con-

dition of marching out of the city with arms and baggage, and returning to France.

Damietta, Belbys, and Suez had been evacuated, and the troops had gone to Cairo: but some forts that still resisted, made separate capitulations.

General Lagrange marched from Alexandria with a body of troops, and appeared suddenly at Rahhmanieh, where he immediately sustained a brisk action, in which he had the advantage; but the superiour force of the enemy obliged him to retreat to Cairo, which he entered some days after its surrender. The wounded were dressed and attended to by the surgeons of the *ambulances* attached to his division.

In order to accomplish his first object, which was the blockade of Alexandria, the enemy stationed his squadron off each of the ports of this city, turned the canal of lake Ma'dyeh into lake Mareotis, which, in a short time, was filled with water, on account of the declivity of the ground, and the size of the canal, and through it he also sent his batteaux and gun-boats. Being now threatened with a complete blockade, and having but a small supply of provisions to support it, the commander in chief sent out a caravan, escorted by 600 men, to procure supplies in the nearest villages; but the caravan was taken, and we were obliged to mix the flour of wheat with that of rice, and thus to make a brackish and indigestible bread.

Our army encamped, and threw up intrenchments behind the ruins of ancient Alexandria, on the circular space that extends from Pompey's pillar to the obelisks of Cleopatra: this ground is hilly, covered with dust, and strewed with ruins. The waters of lake Mareotis in part filled the ditches of this line.

The works of the place were expedited, and the ramparts finished in a short time.

On the 5th of May, 1801, I reported the state of the wounded, and the condition of the hospitals to the commander in chief, and on the 20th of May, I reported the number of wounded discharged from the hospital: more than 1000 had rejoined their respective corps in perfect health, and about 600 that remained in the hospital, were in a fair way of recovery: more than half of these, after their cure was completed, could perform sedentary work, and the remainder were enrolled in the invalid corps.

In the month of June, the change of the wind to N. N. W., and the overflowing of lake Ma'dyeh, which reached our camp, produced a very severe ophthalmia,*

* This disease in many cases left a species of membranous, thick, dense unguis* in the greater angle of the eye, behind the caruncula lacrymalis. This unguis, which might be compared to the membrana nictitans of aquatick birds, grows rapidly until it acquires the size of a lentil, and then remains stationary, or increases impereceptibly. It thus injures vision and prevents the motion of the eye, and the closing of the eye-lids, and keeps up a perpetual irritation. Sometimes the membranous ring extends, and gradually covers the transparent cornea and the pupil, so as to intercept the rays of light.

I saw a great number of these membranous tubercles among the Arabian horses that are very obnoxious to them. They soon occupied one half of the surface of the eye: two of my horses were so affected. I requested M. Loir, the veterinary surgeon of the army, to extirpate them, which he did with ease. I had performed this operation on many of our soldiers. But an excrescence of the same kind was with difficulty removed from the eye of M. Durant, which succeeded to an ophthalmia, some months previous. It was about the size of two lentils, occupied all the greater angle of the eye, covered a part of the transparent cornea, and had formed an adhesion with the edge of the sclerotica, so that it was necessary to detach it: this I did by passing a bistoury under the tumour, and guiding it in a small grooved canula. I then extirpated the tumour by the roots, behind the caruncula lacrymalis. A wash of vegeto-mineral water,

* See Portal's Med. Anat. Vol. IV.

which crowded the hospitals that had just been evacuated, with more than 3000 soldiers.

This disease was treated with great success, but was soon succeeded by a scorbutick affection which made its appearance among the wounded, and became so extensive as to deserve the name of an epidemick.

The ignorance of some persons inclined them to believe it contagious. In order to dispel these fears, and to point out the prophylaxis, I addressed a circular to the surgeons of the army. My opinion of the non contagious nature of this disease was supported by Dr. Savaresi, who officiated as physician general in lieu of M. Desgenettes, whose presence at Cairo was highly necessary, on account of the plague which raged there.

I shall give a succinct account of the most prominent symptoms of the scurvy, as it appeared among the wounded, and those who had ophthalmia, under my care. To this account I shall add a short enumeration of the causes that I believe rendered the scurvy epidemick in Egypt, and then point out the different remedies that were exhibited in its different stages.

In this scorbutick affection, as in that seen by me in North America, I observed three different stages.

In the first stage the soldier is uneasy and melancholy, is disposed to sit or lie constantly, his mind is affected by no circumstance of hope or fear; he loses his appetite, his sleep is painful, and interrupted by disagreeable dreams, his countenance is changed, and becomes pale, his eyes are heavy, and surrounded by a blueish circle:

to which were added a few grains of sulphate of alumen, caused the wound of the conjunctiva to cicatrize.

Since my return to France, I have performed this operation several times on persons who had returned from Egypt with this affection: they all speedily recovered.—These affections often succeed acute and obstinate ophthalmia.

the gums are painful, and of a pale colour, and bleed easily on the most trivial pressure; pains are felt in the lumbar region, and in the limbs, and especially in the legs; respiration is laborious, the pulse slow and unequal, cutaneous transpiration ceases, the skin is dry and rough, like the cutis anserina; the stools are checked, the urine is small in quantity, and earthy, the cutaneous veins are swelled, particularly those of the groin. The patient experiences a lassitude and stiffness in all his limbs, and walks with difficulty. In this stage the wounds soon assume a different appearance; suppuration is diminished, and becomes sanguineous, the edges of the wound are discoloured, and the flesh sinks, becomes blueish and painful, and bleeds on the slightest touch. The cicatrices also assume a peculiar appearance, sometimes they ulcerate and fall into gangrene. This first stage indicates the loss of tone, general debility, and the failure of the vital principle.

In the second stage, the symptoms assume a more serious character; debility increases, the pains are more severe, and attack the head and loins in particular; the patient falls into a state of stupor, and remains in his bed without motion: his limbs are contracted, and his body bent. The face and lips are livid, the circumference of the eyes are lead-coloured, the breath fœtid, the gums ulcerated, and the teeth covered with a blackish crust. Respiration is difficult, and is attended with oppression and stricture of the thorax. The cellular substance of the legs is obstructed, especially between the tendo Achillis and the tibia; and it soon extends throughout the extremity: the swelling is more firm than œdema, and compression produces no pain. Blackish spots appear about the ankles, and along the course of the tibia, and they appear at the same time on the face and shoulders. The constipation increases, the abdomen swells, and the

patient experiences a burning heat at the præcordia, and heavy pains in the hypochondria; the pulse is accelerated, and there is an evening accession of fever, loss of sleep, and at the same time the pains become more intense. The gangrene that appeared in the wounds or in the cicatrices, advances: hæmorrhage is more frequent, and the blood thus discharged is blackish, very fluid, and scarcely coagulable. The callus of fractures becomes soft, and the bones disunited, and a species of moist caries attacks the fractured extremities, which lose their periosteum, and sometimes swell excessively.

In this second stage, nature, endeavouring to overcome the obstacles that impede her functions, redoubles her energy to establish an equilibrium, and to recover the strength which she has lost, but generally in vain: a greater degree of asthenia soon succeeds this re-action.

The last stage of the scurvy is really dreadful to the spectator: to the febrile paroxysms and the above symptoms, succeeds a general prostration. The swelling of the feet and legs increases perceptibly, and they are covered with blackish spots, which, by their rapid progress, give an appearance of sphacelus to the whole limb.

This symptom has not been well attended to by practitioners. It takes place more generally in the land than in the sea scurvy; and no doubt depends on the difference of regimen by land and sea.

During my voyage in 1778 to Newfoundland, of 80 cases of scurvy in our ship, not one had the legs affected.* The scurvy in many cases had reached the third stage, yet its effects were confined to the mouth and thorax, and I was so fortunate as to bring them all in safety with me to France. These blackish spots, which are im-

* See my voyage to North America.

properly treated as gangrenous petechiæ, are nothing more than large spontaneous ecchymoses, caused by the rupture of the capillary vessels of the skin, and by the extravasation of blood, which appears to me supersaturated with carbon and hydrogen, and rendered more fluid, and of a blacker colour. The blood has lost its calorick and its vital properties: the celebrated Fourcroy has made the same remark.* The blood and the vessels, without doubt, during the advanced stages of the disease, undergo a considerable change, and especially in the parts affected with atony and gangrene. This state of the parts appears to be the consequence of a powerful re-action of the system on the blood-vessels and nerves, the violence of which is disproportioned to their strength and resistance.

The resolution of these apparently sphacelated spots, which generally extended over the whole of the inferiour extremities, also supports the opinion that I have advanced. These ecchymoses attacked the thorax, the arms, the shoulders, and the face; but they were here less extensive and less obstinate, because the vessels of these parts retained their tone for a greater length of time.

I will notice other symptoms of the scurvy in its third stage. The tongue is covered with a brown viscous fur, the ulcerations of the gums extend deeper towards the alveoli and the interiour of the mouth, then attack the velum palati, and even the palatine arch. The teeth become loose, and when they drop out, hæmorrhage often succeeds, and is with difficulty arrested: the eyes are sad, and the eye-lids swollen. A cold watery exudation, of a nauseous odour, covers the surface of the body, especially on the abdomen and extremities, and makes the surface of the body appear shining and marbled. The

* See Vol. X. Chemical Works, ch. iii. art. 5.

sphincter of the anus is relaxed, the bowels are open, or affected with diarrhœa, which often degenerates into a colliquative or dysenterick flux: micturition is difficult on account of the paralysis of the body of the bladder. It is often necessary, in this case, to introduce a catheter into the bladder, or keep it there. The difficulty of respiration and the oppression become extreme, violent paroxysms of coughing succeed, with difficult expectoration of a viscid matter, often tinged with black fœtid blood.—The pulse sinks and becomes vermicular, and gradually fails altogether. The powers of the patient are quite exhausted, and he faints frequently. The black spots which may be viewed as so many ecchymoses, become truly gangrenous, dropsy succeeds, and the vital functions cease.

The scurvy may be divided into acute and chronick; the first is generally rapid in its progress.

But I have observed that it never arrives to the third stage before the ninth or tenth day: after this it becomes violent, and the patient dies in five or six days. When the scurvy is chronick, the symptoms are less acute, but often equally fatal.

On opening the bodies of those who died of the scurvy, in addition to the ecchymoses, of which we have spoken, the intestines were found collapsed, and suffused with black blood, the liver and spleen obstructed, the epiploon decayed, the lungs filled with violet-coloured serum, soft in their texture, and having a portion of the same fluid in their cavities.

Such are the principal phenomena that the epidemick scurvy of Alexandria presented, during the continuance of the disease, and on inspection after death.

The scurvy is not contagious, but when it has attained the third stage it may exert an injurious influence on those who have in its first stage, and may injure a

healthy person who lies near the sick, by pre-disposing them at least to putrid diseases.

Many other causes appeared to me to assist in the production of this epidemick. The discharge of the waters of lake Ma'dyeh into lake Mareotis, and the loss of our large caravan of camels deprived us of all communication with Egypt. It became necessary to calculate our resources for the siege of Alexandria, which was now complete. The soldiers were soon deprived of aquatick plants and fresh provisions. For want of wheat we were obliged to make our bread of equal parts of rice and flour. Besides the indigestible quality of rice, when it is taken in large quantities, it was supersaturated with salt;—being so prepared for the purposes of commerce. Hence our bread was very salt, and necessarily injured the digestive organs and the whole system.

Our soldiers fed on this bread for two months; they also consumed a great quantity of salted fish, and made use of water from the cisterns, which was spoiled by mixture with the water of the lake, that had overflowed the cisterns, or by the putrefaction that this water had undergone, from the quantity of slime that had long remained in these reservoirs, and could not be removed.—To such unwholesome food and drink may we attribute, in a great measure, the appearance of the scurvy among our troops.

Wounds and ophthalmia, by leaving the men in a state of weakness, and by confining them a long time in the air of the hospital, vitiated as it was with animal effluvia, predisposed also to this disease.*

* Animal exhalations, even in wards that are airy, if crowded with sick, are among the principal causes that produce scurvy. Formerly, we saw every year from 150 to 200 scorbuticks in the hospital of invalids; now, we scarcely see one, because M. Sabatier directed the sick to be kept in separate rooms.

The principal predisposing cause of this disease, was the continual moisture to which the soldiers were exposed after the overflowing of lake Ma'dyeh. A large quantity of mephitick gas was produced, by the decomposition of a great number of vegetable and animal substances that were in lake Mareotis: add to this, the effect of the unclean cloacæ throughout Alexandria, and twenty-five or thirty hospitals that we had established in this city; and finally the saline air of the sea: add to these that we were also obliged for a long time, on account of the proximity of the enemy, to be on the alert, and *in bivouac*.

At first the scurvy appeared in a very slight manner, in redness, and superficial ulceration of the gums, and some wandering pains of the limbs, lassitude and anxiety; it then attacked a considerable number of our soldiers. By washing the salt from the rice before it was ground, we improved our bread. By giving out vinegar, dates, molasses, and coffee to the soldiers, the disease was, in a measure arrested; but as we were entirely without fresh provisions, it returned, and assumed an epidemick character. A great part of the army and of the inhabitants were attacked by it at the same time, so that on the first of August, 1801, there were from 14 to 1500 scorbuticks in the hospitals of Alexandria. On an average from four to five died each day. Among the inhabitants, from six to eight died every day, as there was a greater proportion of them sick, and among them the disease was more acute. They were often without potable water, and had no other aliment but bad rice.

It should be noticed, that during the whole continuance of this disease, there were but two or three cases of the plague, although at the same time it was ravaging Cairo and Upper Egypt. May we not hence infer, that one epidemick is excluded by another, which is common

to the same country? The Egyptians have always observed, that when the small pox is epidemick, the plague does not appear, and vice versa: perhaps, also, the new sea that actually surrounds Alexandria, by cooling the south winds (the *khamsyn*) that blow over the deserts of Lybia, may in some measure remove the causes which produce this disease.

As the officers had better provisions than the soldiers, they were less obnoxious to the scurvy. I saw many cases in which the inferiour extremities were disposed to gangrene. By means of such remedies as will be described, we removed these large ecchymoses, and the sick generally recovered.

The horses of the cavalry being now almost useless, on account of the blockade and the want of forage, I requested the commander in chief to have them killed, to feed the soldiers and the sick. Experience taught me on more than one occasion, that the flesh of these animals, when young, which was the case with our Arabian horses, makes good broth, and is pleasant to the taste. The horses were daily distributed pursuant to orders. This innovation at first excited the murmurs of some ignorant persons, who considered the use of this food as dangerous to the health of the troops. I was nevertheless so successful as to inspire, by my own example, a general confidence in its use. The sick found it very good, and I do not hesitate to say, that it was the principal means of curing them. We rendered bread tolerable by washing the rice of which it was made.

We varied the treatment of the scurvy according to its different stages, the constitution of the patient, and many other circumstances. But we were without many articles of necessity until the capitulation of Alexandria.

In the midst of this distress we were so fortunate as to receive some chests of medicines from France, con-

taining quantities of excellent chincona, ipecacuanha, and cantharides: almost at the same time we received two others, that Mr. Boudet took care to send through Rosetta. Besides these, we found in Alexandria several quintals of tamarinds; and finally, a small Greek vessel, loaded with lemons, got in the harbour of this city. According to the report of the medical staff, the hospital-stores might be sufficient until the September following.

In the first stage of the scurvy, some mild emeticks of ipecacuanha, followed by one or two laxatives, produced good effects. The patient drank tamarind water, sweetened with molasses; in the evening some acidulated and antispasmodick potion was exhibited, and in the morning one or two cups of coffee. Mucilaginous enemata, sharpened by vinegar, were also used.

Low diet always increased the disease, and on this account we allowed them rich broths, porridge of rice, &c. When wine could not be had, coffee was substituted; vinegar was used as a gargle. These means, with exercise, were often sufficient to re-establish the health of the patients. But when they returned to their corps, encamped on the borders of lake Mareotis, and were again exposed, they relapsed, and the disease became more severe, and was more rapid in its progress. The scars of wounds, which in the first attack had scarcely changed colour, generally ulcerated when they were brought to the hospital a second time. All the other symptoms of scurvy passed from the first to the second stage, and speedily to the third. The powers failed, and muscular action was almost entirely destroyed. There was no time to depend on light medicines; and camphor in the evening, and opium in the morning were added to acidulated drinks. I remarked that the latter had a fine effect in this disease. I had before used it in the hotel of invalids, and the military hospital of Paris. Next day we gave the

patient a dose of bark infused in brandy, and diluted. The common drink was oxycrat, or sweetened tamarind water. When the disease had arrived at the third stage, the dose of bark and brandy was increased, and repeated often during the day; the camphor, opium, and coffee were also increased in quantity.

Vesicatories, without producing any important effects, were generally injurious, on account of the gangrenous ulcers that commonly followed their application. I supplied their place advantageously with sinapisms, or embrocations of very warm vinegar: the wounds were dressed with vinegar, saturated with camphor, and pulv. chinchon. Embrocations of camphorated brandy, and plasters of styrax, sprinkled with flowers of sulphur, and applied warm over the ecchymoses, and the œdema of the legs, and retained there by bandages, moderately tight, assisted the internal remedies. These plasters should be changed only every third or fourth day. Their use should be persevered in until the cure be complete.

Of 3500 scorbuticks who were admitted into the hospitals of Alexandria, 262 died between the first of July, and the 10th of October, 1801, when the troops embarked. More than 200 returned to their corps before and during the embarkation of the troops. About 700 sailed for France, and were either well or convalescent when they performed quarantine, except six or seven who died on the passage. Above 100 of those who were left in Alexandria in the worst stage, afterwards returned to France.

After the capitulation, the English supplied us with wine, with fresh meat, and beans, which soon restored our men.*

* Doctors Savaresi, Garos, Balme, and Franck, were very active during this epidemick.

On the 17th of August, the army of the allied powers attacked our line in its whole extent: and although their troops were much superiour in numbers to ours, they were vigorously repulsed with loss. Lieutenant general Rampon commanded. During the fifteen days that succeeded this affair, there were many other partial attacks, in which many were wounded. They were dressed as soon as possible, on the field of battle, by means of the *ambulances* that I had attached to each division: and hence they were carried to a fortified place, in the first inclosure of the city, where I had caused a very large shed to be erected.

In the mean time the main body of the enemy penetrated into the peninsula of Alexandria, from the side of Debarkadere, corresponding to the old port, (the weakest part of our line) forced the troops that defended this place, and advanced to the ramparts of old Alexandria. Our soldiers made a noble resistance, and gave up the ground only by inches; but a part of the fleet being anchored before old Alexandria, entered the old port, and uniting its fire with that of the flotilla on lake Mareotis, obliged our troops to gain the second line. Fort Marabou was battered in breach. Its defence did honour to the besieged. Two surgeons of the navy were there killed, and a third, Mr. Faure Moro had one leg shot off, and another fractured. He owed his recovery to amputation, which I performed a few hours after the accident, through the thick part of the condyles.

We were now surrounded on all sides, and closely besieged, and our hospitals* were crowded with the sick

* The commander in chief issued the following order, July 18th, 1801.

Sect 1. There shall immediately be formed a general directory of hospitals. It shall be composed of—

and wounded. A situation so unfortunate, the sickness of the troops, the want of many articles of the first necessity, and other motives, which to me were unknown, induced the commanders of the two armies to open negociations. A council of war of all the generals was convoked by the commander in chief, Menou, and decided on the impossibility of longer sustaining the siege. The physician and surgeon general of the army were also called to this council, to report the state of the hospitals, the character of the diseases which then prevailed, the health of the troops, and the quality of their food. This report was annexed to the capitulation that was signed on the 31st of August, and provided that the French troops should return to France with all the honours of war.

1. Brigadier general Delegorgue.
2. Chief of brigade, Lhuillier.
3. Adjutant commandant Higonet.
4. The intendant commissary general of the army.
5. The surgeon general of the army.
6. The physician general, or person officiating as such.
7. The commissary Raymondon.

Sect. 2. No extraordinary services shall be done in the hospital department, unless by the orders of this directory, in the deliberations of which a majority shall decide.

Sect. 3. No expenses will be allowed, unless by their order.

Sect. 4. The members of the directory, either jointly or individually, shall have a right to visit and inspect the hospitals, the laboratories, the kitchen, larders, magazines, and all other places connected with the hospitals.

Sect. 5. The principal officers of health being obliged, from their duty, to superintend the concerns of the sick, shall have power to issue orders which shall immediately be obeyed, and a report of them shall be made to the directory.

Sect. 6. The directory shall make a daily report of its orders to the commander in chief.

It shall also be invested with the power of punishing those who are connected with the hospital department, for the commission of faults, or omission of duty.

I cannot speak too favourably of the assistance I received from all my colleagues, from the surgeons of the *ambulances*, and of the army and navy at this time. The latter were directed by Mr. Leclerc.

I embraced the opportunity that the capitulation presented, of visiting the camp and hospitals of the English army. I was attended in this visit by Mr. Yonck, the inspector general of the medical staff of the English army, who had the entire medical and administrative direction of the hospital department, without the interposition of any officer between himself and the commander in chief. His hospitals were well kept, and provided with every thing necessary But I was astonished to find but three successful cases of amputation, out of a great number of soldiers, on whom this operation had been performed. I have accounted for this want of success in my memoir on amputation. This proves the superiority of the French surgery over that of the most civilized nations.

In the centre of the English camp, I saw the army of Indians before mentioned, (cepays or sepoys.) They were clad like the Arabs, and their customs and manners were nearly similar. Among them were men of many nations, and even some Frenchmen. This army was about eight thousand strong, and came from Ceylon, the gulf of Bengal, and the coast of Coromandel. They had travelled more than three thousand leagues, by the way of the Red Sea, to reach Egypt; and notwithstanding the dangers and difficulties of this route, had arrived in tolerable good condition, and in time to unite with the English forces. As these troops were more accustomed to the climate than the English, they suffered less from the ophthalmia and the plague.

According to the report of Dr. Gregor, physician general of the expedition, they had lost, during their stay at Rosetta, and at Alexandria, the following numbers:

Of the plague 165 soldiers, 38 Europeans, and 127 Indians	165
Of the bilious remittent fever, or yellow fever, 18 Europeans, and 92 Indians	110
Of hepatitis, 64 Europeans, and 12 Indians	76
Of the dysentery, 148 Europeans, and 47 Indians	195
Pleurisy, 4 Europeans, 6 Indians	10
Inflammatory pleurisy, 2 Europeans	2
Of wounds and accidents	134
Total.	692

One hundred and fifty-eight who became blind, or lame, were sent back to England. So that of 7,886 sepoys, 692 died, and 158 were sent back as invalids.

It may be observed, that of this number, more Europeans died of the dysentery and hepatitis, and more Indians of the plague and yellow fever.

This army embarked on the Red Sea, and returned to India, avoiding Cairo, where the plague raged. They adopted, on their arrival in Egypt, the rules that we had issued, to prevent contagion, and to diminish the effects of this disease.

I was also requested by the grand pacha, to give him some information on the principal causes of the plague, on its effects, and the means of curing it.

By virtue of an article of the capitulation, we were directed to consult with the inspector of the English hospitals, to determine,

1st. On the cases of disease, or wounds that could not be sent to France;

2d. On those cases, the subjects of which admitted of embarkation;

3d. On their distribution and arrangement, in the different hospital ships that had been provided for them, and finally, to take such measures as were necessary, for their assistance and subsistance on the voyage. And in order that we might be clothed with the proper authority, the commander in chief appointed Mr. Savaresi, who was acting physician general, and myself, members of the commission for fitting out the fleet.

The number of wounded and sick, who set off with the army, was 1,338, besides the invalid corps, which was also provided for in the same manner during the voyage. It was with difficulty that we could embark the first of them: many timid and ignorant persons dreaded a contagion that did not in reality exist, and insisted that we should leave all the scorbuticks at Alexandria, with those who were badly wounded. But they all arrived in France in good condition and convalescent, except eight, who died on the passage, and two of these by accident.

One hundred and thirty, who were badly wounded, or had the scurvy of the worst character, were left at Alexandria, under the protection of the English, and under the direction of Mr. Yonck. They were attended by French surgeons: the wounded by Mr. Reynaud, a surgeon of the first class, and the others by Dr. Franck. They returned to France two months afterwards.

The whole army embarked between the 23d of September, and the 17th of October, and sailed for France. I embarked on the 17th of October with the commander in chief, his family, and part of his etat-major, on board the Diana, an English frigate. We arrived at Toulon on the thirtieth day after we left Alexandria.

I hastened, after performing quarantine, to inform the board of health at Toulon of the health of the troops, and of the commander in chief, who was now convalescent from the plague. He soon recovered. We purified his

furniture, and that of our companions, by washing them in the sea-water.

I made a report to the minister of war, and to the board of health, as I had always done after every campaign, detailing what related to my department.

The first letter that I received from the board, was while we performed quarantine. It acknowledged the receipt of all the reports that I had made during the expedition.

I was also informed by this letter, that the government had expressed their approbation of the conduct of the medical and surgical officers, in the most flattering terms, and had confirmed all the promotions recommended by me to the commander in chief, during our stay in Egypt and Syria. The subjoined letters, although addressed to the surgeon general, will testify to the good opinion that the government entertained of the surgeons of the oriental army.

LETTER. I.

PARIS, DECEMBER 24th, 1801.

The Minister of War to D. J. Larrey, Surgeon General of the Army of the East.

SIR—The commander in chief has made the government acquainted with the unbounded devotion, and great success that you, and your colleagues, have displayed in the preservation of this most valuable army.

The government, that fondly watches over its welfare, has thus witnessed, through the medium of your attention, the accomplishment of one of its dearest wishes, the security of a part of the French armies, from the dangers to which they were exposed, in a new and untried cli-

mate. While it applauds your useful and glorious labours, it invites you to persevere in them, that you may increase the obligations which are due you from the army that you have preserved, and from a government that is so deeply interested in its security.

I salute you,

(Signed) AL. BERTHIER.

LETTER II.

JANUARY 8th, 1801.

The Minister of War to D. J. Larrey, Surgeon General of the Army of the East.

SIR—You have rendered such important services to the wounded soldiers of the army of the east, as to merit the particular attention of the first consul. He is satisfied with your zeal, and with the greatest pleasure I hasten, in conformity to his orders, to inform you of it.

I salute you,

(Signed) AL. BERTHIER.

LETTER III.

JANUARY 28th, 1801.

The Minister of War to D. J. Larrey, Surgeon General of the Army of the East.

SIR—The government has neglected no opportunity of making known to the French nation, the services that you have rendered the army of Egypt. Your name will be henceforth associated with those of the benefactours of their country. Your lady, who is in good health,

has just received 1,500 francs, as a testimony of national gratitude.

I feel, Sir, the most lively sensation, in having been able to do justice to your merit in the account of the expedition to Egypt, which has been published by me. I have there stated what has been often seen, that you, "*at the head of your brave associates, dressed the wounded under the fire of the enemy, and even in the entrance of the breaches!*" I have promised to support your claims to the gratitude of the nation. I shall with punctuality fulfil this promise.

I salute you,

(Signed) AL. BERTHIER.

At the expiration of our quarantine, I repaired to Marseilles, where the whole army was re-united. Here my functions as surgeon general of the army of the east ceased, and hence I set out for Paris, to take the place of first surgeon of the consular guard, to which I had been appointed by an order from the first consul, dated, November 2d, 1800, as communicated to the army of Egypt, by an order of the day, February 12th, 1801.

The affectionate testimonials of friendship and gratitude that I received at Marseilles, from the soldiers of the army, and from my comrades, made these the happiest moments of my life, and were the most grateful recompense for my services. I shall never forget them.

CAMPAIGNS

AT BOULOGNE, ULM, AND AUSTERLITZ.

On my arrival at Paris, I had the honour to be presented to the first consul, who received me with marks of affectionate kindness. My appointment to the place of chief surgeon to the consular guards, was confirmed by a commission that he ordered to be delivered to me on the 22d of March, 1802.

After having been installed in this place, I arranged the notes which I had made on the different diseases that had fallen under our care and notice during the expedition in Egypt, and from these materials I composed a work under the title of the "*Surgical Account of the Army of the East.*" At the same time, at the request of a great number of pupils, I commenced a publick course of experimental military surgery. Finally, in compliance with the law of the medical school, enacted 10th March, 1803, I defended a thesis on amputation: professour Sabatier, my illustrious master, was at this time president of the institution. This probationary essay was complimented by the professours and the auditory, and I was the first on whom the title of doctor of surgery was conferred, according to the new regulations.

My *Surgical Account* was published, and by permission dedicated to the first consul. It was well received by the institute of France, and by most of the foreign and national universities.

A new order of things now arose, and in a short time the first consul was unanimously elected emperour of the French, with the title of Napoleon the First.

The pope came to Paris to consecrate the head of the government: this ceremony was performed December 2, 1804, in the metropolitan church.

Soon afterwards the emperour repaired to his armies, in order that he might avenge the violation of the treaty of Amiens, by the English. He made great preparations for an invasion of England. Every port of the sea opposite this island, was soon filled with vessels and troops. The imperial head-quarters were established at Boulogne, and thither I repaired, by order of his majesty.—The troops had already embarked, and waited but the signal of departure, and the arrival of the French and Spanish fleets to cover the attack, and augment their force. I had taken such measures as were necessary to enable me to be near the imperial guard, during the voyage, and when the descent should be effected. The ships re-echoed with the shouts of our soldiers, who burned with impatience to land on the enemy's shore. If we might judge from the motions of the English, they were already struck with terrour, and seemed unable to avert the threatened invasion.

But in the midst of these immense preparations, a new continental coalition was formed, and France in her turn was threatened by the preparations of Austria. During this period also, the combined fleet returning to its place of destination, encountered that under admiral Nelson, and fought the memorable battle of Trafalgar. In a moment every thing was changed, and a new campaign was resolved on. The troops were debarked, formed into columns, marched rapidly through France, crossed the Rhine, and entered Germany before the enemy were well aware of their movement.

The emperour had then returned to Paris, whither I followed to receive new orders from marshal Bessieres, general of the guards. I then repaired to Strasbourg,

where I organized a division of *flying ambulance* for the imperial guard, similar to those I had established in the army of Italy, in 1797. The emperour arrived here the 4th of September, 1805, and the whole army had crossed the river before the 10th of the same month. We advanced rapidly towards the Danube, where the enemy was posted. The fatigue of our forced marches was relieved by the beauty and fertility of the country through which we passed, and by the kindness of its inhabitants: we had soon passed through Baden, Wurtemberg, and a part of Bavaria, which border on France. The advanced guard of our army, which was led by the emperour, called the *grand army*, had several engagements on the Danube, and forced a passage over it at Donawerth.—The *ambulance*, which always moved with the guard, was ready to render immediate assistance to those who were wounded in these contests. The enemy retreated precipitately towards Ulm and Elchingen, where he hoped to check our progress; but our march was so rapid, that he had not time to destroy the bridges and prepare for his defence. The head-quarters followed the advanced guard, and were soon fixed at Augsburg. After a few hours' stay in this city, the guard marched towards Berghausen. We were much incommoded during our march, by a cold and heavy rain, and by the frost and snow, but our progress was not impeded by it, and but few of our men were sent to the hospitals. We were again obliged to dispute the passage of the river at Leypenn and at Elchingen. In the first charge, which was severe, we lost some men; but we gained possession of their batteries on the bridges, and once more crossed the Danube. The resistance at the abbey of Elchingen was serious, and the enemy lost many of their troops in this affair. I had the wounded of both nations collected together in the abbey, and attended to them without distinc-

tion: none of the guard were wounded, but my *ambulance* was the only one that had succeeded in crossing the river before the rise of its waters, which took place the same evening. I therefore engaged in dressing the wounded of the line. The amputations that we were obliged to perform for many severe wounds, were not so successful as usual, because the greater part of the wounded had been exposed to the inclemencies of the weather for thirty-six hours.

In the mean time 30,000 of the enemy, commanded by general Mack, took a position on the heights of Ulm. While their generals were devising a plan of attack, our columns, that were considerably advanced, cut off their retreat, surrounded and forced them into the city, where they expected to be able to support a siege; but they there found the magazines without stores, and soon saw themselves menaced by the severe fire of our artillery, which had taken post on the heights that commanded the place that had just been abandoned by them. The first fire convinced them of their danger, and they demanded a capitulation; it was granted, under condition that the whole army should be prisoners of war, and should lay down their arms on the glacis of the ramparts. The generals and officers alone were to return home on their parole.

The surrender of Ulm was a military event of the greatest importance. The enemy's cavalry was dismounted, and their horses were given to our foot-dragoons.

The head-quarters of the imperial guards returned through Elchingen to Augsburg, where we also established large hospitals. This is a rich commercial city, and afforded us great supplies for the wounded.

The Austrians were rapidly retreating towards their capitol, and the French army doubled their speed to overtake them. The head-quarters remained two days at

Munich, to give audience to the envoys of the hostile army. In the mean time, I visited every part of the city worthy of notice, its superb fountains, publick buildings, and magnificent palaces.

Here I saw Dr. Sœmmering a second time, and I visited with pleasure, the valuable anatomical museum which he has collected. I shall speak in future, of some articles of this interesting collection.

The emperour remained no longer in Bavaria than was necessary to erect this electorate into a kingdom, and then marched towards Vienna without opposition.

The army of Italy, and a column of French troops that had marched towards Tyrol, had made nearly the same progress as the grand army, and all our forces now were about to be concentrated, in order to act with more vigour.

The emperour's head-quarters were established at Schœbrun. The advanced guard under prince Murat, entered Vienna without resistance, and made prisoners of several battalions of the Austrian rear guard, just as they were preparing to cut down the bridges, and to take positions on the left bank of the Danube, while the remainder of the army was advancing in different directions, to cross the river at this place.

During the whole of our march to Vienna, we were exposed to snow and rain, and the rapidity of our progress did not allow the soldiers time to dry their clothes. They were also deprived of such articles as were necessary to protect them against the vicissitudes of the weather, as the baggage had not been brought on, and rations could only be regularly distributed in the large cities: Yet we had but few sick. Indeed, at our entrance into Vienna, our soldiers seemed to have become more robust. This phenomenon will account for the success with which the most remote expeditions of the Greeks and Romans were accomplished.

Indeed, the soldier, who is accustomed to the use of arms, and animated by the spirit of his profession, if he have attained his complete physical growth, will not become sick under any fatigue, or rigour of climate, provided he be not subjected to too long abstinence. The functions of his organs are doubtless more accelerated, but this increase of action is not injurious to his health, if at intervals he is permitted to repose a few hours. His spirits do not flag from such unusual exertions, and his repose is disturbed by no uneasiness of mind. It would be dangerous to leave him perfectly quiet in his tent, after marching all day, exposed to the rain or snow. He would then fall into a profound sleep, which is increased by the cold and fatigue that he has experienced: his animal powers are weakened, and in a state of suspension. The mucous secretions and cutaneous exhalations are diminished, while the internal absorption goes on with the same activity. The moisture of the clothes penetrates more easily, the nervous sensibility is altered, the capillary system is obstructed, and next the organs become affected by sympathy, or by the communication of heterogeneous principles: hence arise those diseases that attack immediately, and more especially rheumatick affections. It is therefore favourable to the soldier's health, that when he arrives at his destined station with an empty stomach, he is obliged to seek or cut wood to make a fire, to procure meat and peas for his soup, and afterwards to cook them himself. By thus exercising, he cannot be injured by the moisture of his dress, which is soon evaporated by the fire of the *bivouac:* his animal powers are supported, he takes but little rest, he sleeps a few moments, but does not permit the functions and activity of his organs to be arrested by it. He takes his repast, and is soon prepared to march again. When troops arrive at their places of destination, and find their

soup ready, covering, fire, beds, or good straw, they should be compelled to take the salutary exercise beforementioned, and be obliged to *bivouac*. The interest of the inhabitants of the country, the security of the soldier himself, more especially when near the enemy imperiously demand it. This plan of conducting a war is certainly the best for the health of the troops, particularly when they pass through countries as fertile as Germany, where the soldiers never were without bread, meal, peas, and beer, a drink far more wholesome during a campaign than spirituous liquors, which are commonly abused.

The remainder of the Austrian army having taken the road to Moravia to join the Russians, the emperour and his guards set out from Vienna the 26th of November, 1805, to engage them. We directed our course towards Znaim.

We soon learned that the advanced guard of our army had had a severe engagement with the Russians at Hollobrun. Indeed, on the next day, we found the wounded in the borough, and the field of battle strewed with the dead, and the spoils of the Russians. The greater part of the wounded had not yet been dressed. I halted my *ambulance* to assist them, and to perform the necessary operations, and we rejoined the head-quarters at Znaim.

After this battle, the Russians made proposals for a peace, which were not accepted. Their army continued to retreat precipitately towards Brünn, where they did not think proper to halt, although the citadel was strong. Prince Murat entered it without resistance.

The emperour had now established his head-quarters at Proslitz, in the beautiful and immense plains of Moravia, covered with abundant crops of grass and grain. We reached Brunn the 18th of November, 1805. It is a fine city, well built on the descent of a hill, on the sum-

mit of which is placed the citadel, one of the strongest fortified places of Germany. We found here 60 pieces of cannon, 600 muskets, and considerable magazines. The convents and civil hospitals afforded every thing necessary for the establishment of our own. We immediately took possession of them, foreseeing that, if the two armies met near this city, the contest would be severe. Great preparations were therefore made to receive the wounded. I prepared the hospital *la Charite* for the wounded of the imperial guards.

Our army formed a junction in this city and its environs.

The Russians had taken post on the heights of Vischau, and detachments of their cavalry hovered near us, and engaged some of our troops.

Eight or ten days were spent in observations and conferences. Finally, preparations were made at Brunn, to receive the wounded of a great battle, which was supposed inevitable. I had prepared the *ambulance* of the guards, with every thing necessary for the first dressings of the wounded.

Being well aware of the intentions of the Russians, the emperour moved his army, and stationed it in front of the enemy, on a circular line of hills. Every disposition being made on the 1st of December, 1805, he resolved to give them battle next morning.

In the absence of Mr. Percy, who remained at Vienna to organize some hospitals, his majesty directed me to take the general direction of the medical staff of the army. He also requested me to make every preparation necessary for affording prompt assistance to the wounded.

After having visited the positions of all the *ambulances*, I hastened to issue instructions to the principal surgeons of corps, and to the surgeon majors of *ambulances* and regiments, that they should be prepared on the morrow,

and should unite at the principal posts that I had pointed out. In conformity to the orders of his majesty, I wrote to the intendant of the hospitals of Brunn, requesting him to furnish the central *ambulance* with hand-barrows, &c. I was seconded in my operations by M. Dagiaut, commissary of war.

The proclamation, announcing the intended attack of the morrow, was inserted in the order of the day. A general expression of joy burst forth as his majesty reviewed the line, which was electrified by his presence. By an unanimous and spontaneous motion, the whole army formed whisps of straw and set them on fire, and in a moment you beheld a new kind of illumination symmetrical and brilliant, by more than 45,000 men. The sky was serene, and the troops formed on the hills, as in an amphitheatre.

The rain and snow had ceased to fall, the weather was settled, and gave promise that the ensuing day would be fine.

At break of day, the signal to engage was given on both sides, the enemy having also resolved to attack us the same day. The first shock was very severe, but success was never doubtful. A most complete victory on our part was the result of this brilliant and memorable battle, *called the battle of the three emperours, or the battle of Austerlitz.* The enemy lost more than forty stand of colours, or standards, more than five hundred pieces of cannon, twenty generals, and 30,000 men prisoners. Between 10 and 12,000 were killed on the field of battle, or drowned in the lakes, besides a great number of wounded that we successively collected, and had transported to Brunn. Our wounded were almost all dressed on the field of battle, because the weather was favourable.

Inspector general Percy having rejoined the army, I returned about the height of the engagement to my post

among the imperial guards, some of whom had been wounded by a furious charge on the Russian imperial guards. Every operation and dressing was performed on the field of battle, and they were in succession conveyed by the carriages of our *flying ambulance* to that of the centre, which had been established in the granaries of a mill.

The speed of these carriages enabled us to use them in transporting the wounded of the line. I followed the movements of the guard with my *ambulance*, but I halted wherever my presence could be useful.

Never did a field of battle present a more awful picture of destruction than that of Austerlitz, covered with the dead, the dying, and the wounded, with innumerable fragments of arms and effects scattered in every direction, and abandoned by the Russians on the first attack.

We returned about four hours after midnight to the central *ambulance*, to dress those who had not received immediate attention. I ordered them all to be removed next day to Brunn, accompanied by surgeon major Paulet, to be admitted into the convent that I had prepared for this purpose before I left the city. His majesty also directed me to preserve the body of colonel Morlan of the chasseurs, who was killed in the first charge.

The emperour pursued the remains of the Austro-Russian army several leagues beyond Austerlitz. He halted at the *bivouac* of his advanced guards at Saruschitz, to receive the ambassadours of the czar Alexander, and the emperour Francis II, who requested an interview with him.

After this conference, the emperour Napoleon, and the imperial guards returned to Brunn, where negociations for a peace were opened. The treaty was signed some time afterwards at Presburg. I went before the guards to Brunn, to visit the wounded, and to embalm

the body of colonel Morlan, of which I spoke in the memoir on the Egyptian mummies.

Of the Epidemick Disease of Brunn.

We had scarcely collected the wounded of the French and Russian armies, the number of whom was considerable, when an epidemick disease appeared among them, which we recognized as a malignant, nervous and putrid hospital fever, (adynamico-ataxick) or contagious typhus of the old nosologists. It attacked with heavy pains of the head, and irregular chills, especially of the extremities. These chills were succeeded by a transient burning heat.

The wounds in which suppuration first diminished, were affected with the hospital putrefaction,* which advanced in the most rapid manner. The pains of the head, the external heat and anxiety increased: the pulse which at first was small and slow, became more quick and irregular, and the urine was turbid and yellow. In some cases, costiveness attended, but generally a diarrhœa was one of the first symptoms of the disease. The ear and the eye became exquisitely sensible: the functions of the muscular system were disordered: a tremour of the limbs, subsultus tendinum, and delirium commonly attacked the patient at the end of the first stage.

To the above symptoms, succeeded pains of the epigastrick region, wandering colick pains, vomiting preceded and attended by singultus, retention or suppression of urine, clammy and colliquative sweats, an increase of

* When this affection takes place, the suppuration is of a grayish lead colour: thick and glutinous; and emits a fœtid odour: the edges of the wound puff up and become black. The heat and sensibility of the parts affected are destroyed.

a dysenterick discharge of fœtid black blood, and finally, hæmorrhage of the nose. The tongue was black in the centre, and dry and red on its edges: the gums and teeth became covered with black glutinous sordes. The patient sunk into a state of drowsiness and general insensibility, made involuntary motions, which, on account of the prostration of strength, were but of short duration. The pulse decreased in volume, as it increased in quickness. The features of the face became surprisingly altered, and indicated the change of the organick functions. Whenever I saw this symptom in the first stage, I predicted a fatal issue.

These symptoms generally increased while the disease was passing from the second to the third stage. The pulse intermitted, exacerbations or paroxysms occurred once, or even twice in the twenty-four hours. During the paroxysms, the delirium in some cases became more furious, and was often attended with convulsions. Turbid or diminished secretion of urine were fatal symptoms, and if it suddenly became clear and limpid, the danger was most imminent: the abdomen then was inflated, the internal spasm increased, and the singultus returned. The patient lost all his intellectual faculties, fell into extreme debility, and soon sunk. When the disease terminated in this manner, the patient rarely survived the ninth day; but generally died on the fifth or seventh. In this last stage, the wounds assumed a real gangrenous appearance, and emitted a very fœtid odour. The effluvia produced by the purulent secretion or exhalation of these ulcers, was very infectious, and all that were near those sick of this epidemick were in great danger, as were also the physicians who visited them. All who lay in their wards were soon attacked by the same symptoms. The disease spread further and further, infected the hospitals, and finally, the houses in their vici-

nity; either by the communication of persons with the sick, or the transmission of inquinated air by the south wind, especially when it had but a short space to traverse. These winds, as I remarked in speaking of the plague, favour the production of almost all ataxick diseases.

The transportation of the sick also extended the contagion, which increased to such a degree, that the hospitals of the line lost one-fourth of their wounded. They who had fractures of the limbs, and especially of the inferiour extremities, were its first victims. Because in the first place, these wounds affected the membranes of the bones, the ligaments, and the aponeuroses, which receive their sensibility or life from the trisplanchnick nerve, and thus the power or life of the nutritive system is impaired. And 2dly, because adynamia more readily follows the debility of these functions produced by this sympathetick affection. And finally, because the permanent inaction to which the wounded are obliged to submit, subjects them continually to the action of the infected atmosphere of the wards, and renders them more obnoxious to this disease. These facts support the arguments adduced in my memoir on amputation, to prove the necessity of taking off the limb on the field of battle, when we cannot expect to cure the fracture by the usual mode of treatment.

The hospitals in which those who had fevers were deposited, were soon crowded, and the mortality was increased in proportion. The epidemick also broke out among the Russian prisoners who had been from necessity crowded in great numbers into the churches, and other large buildings: finally, it soon spread among the inhabitants, and extended itself along the whole line, and even into France, in consequence of the transportation of the prisoners, and of the sick of both nations.

The disease was irregular in its progress, when it attacked those who had fractures of the thigh. It ran its course with great rapidity, and nothing relieved the symptoms. I saw several superiour officers who died with such wounds very suddenly, after I had entertained strong hopes of their recovery. Where the wounds were less severe, the disease was milder, and its progress less rapid. Many of the sick recovered, by the use of suitable remedies.

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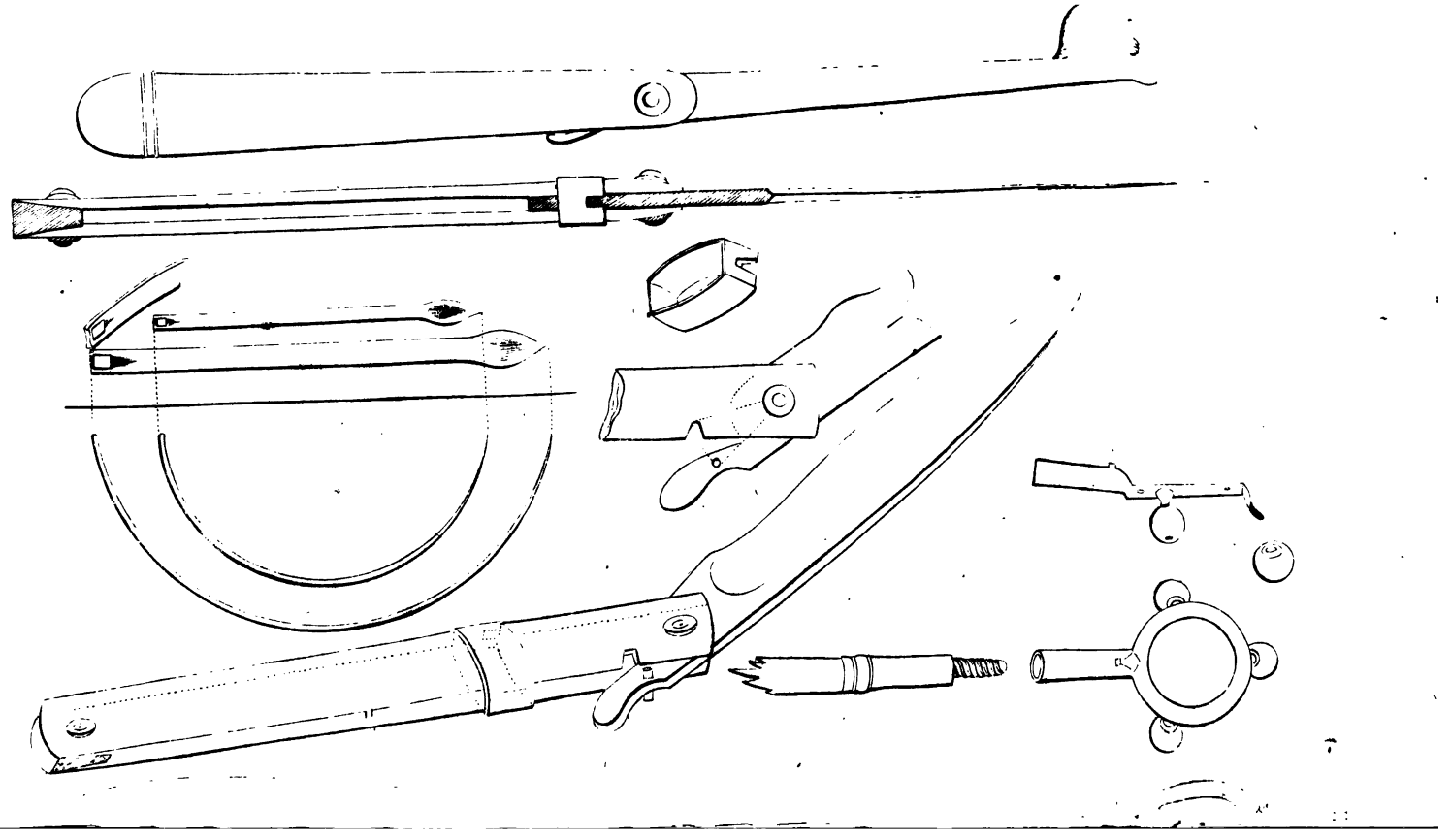

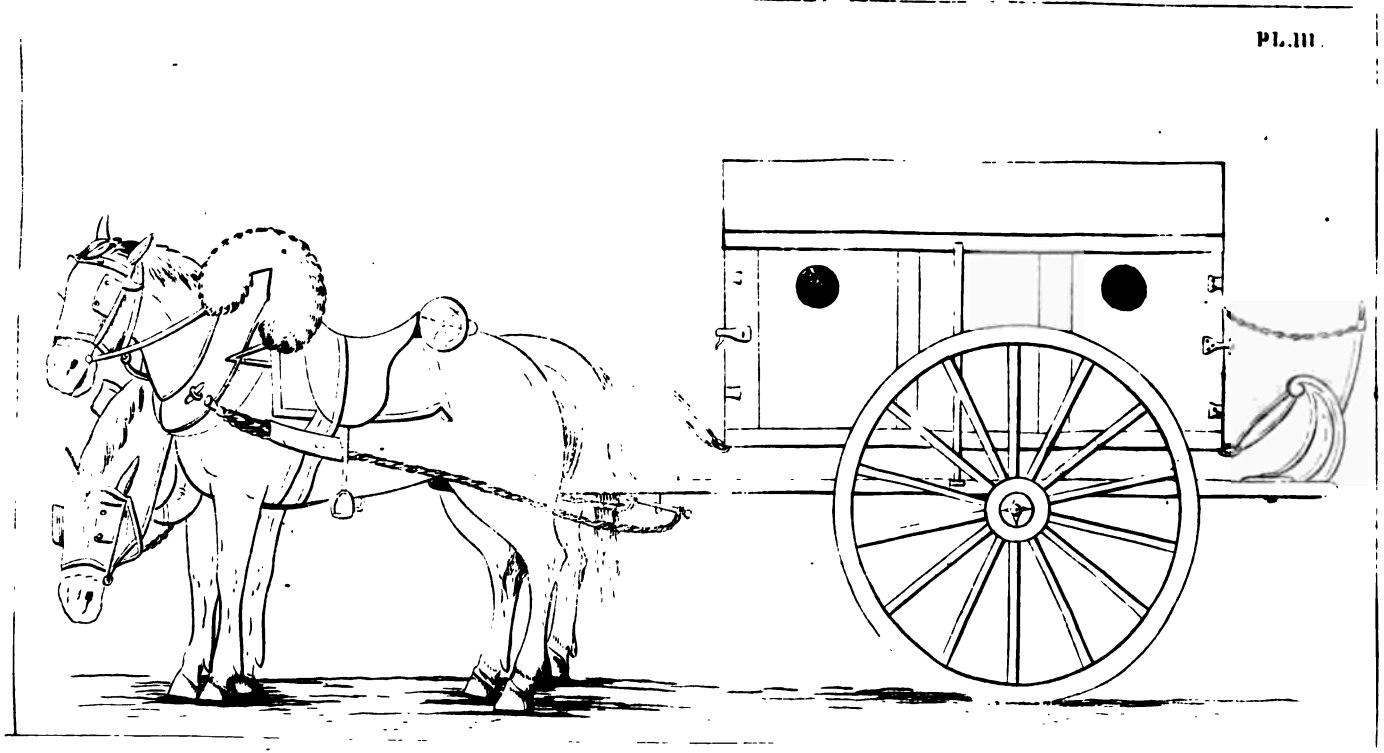

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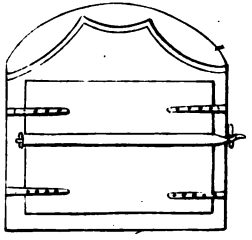
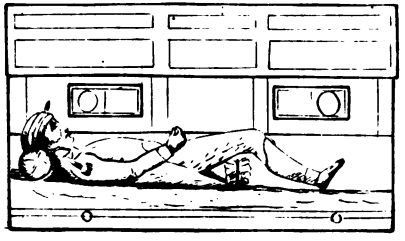
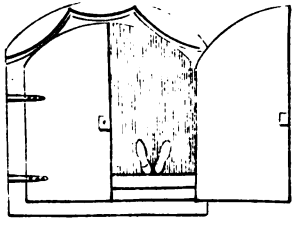
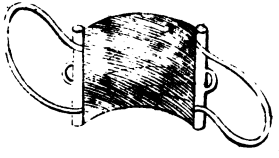
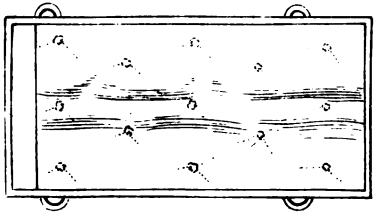
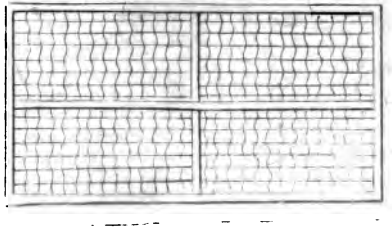


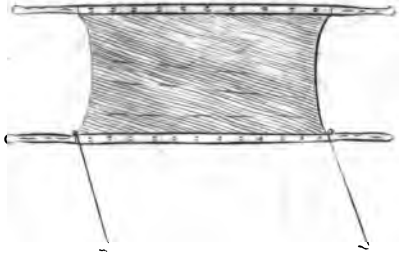


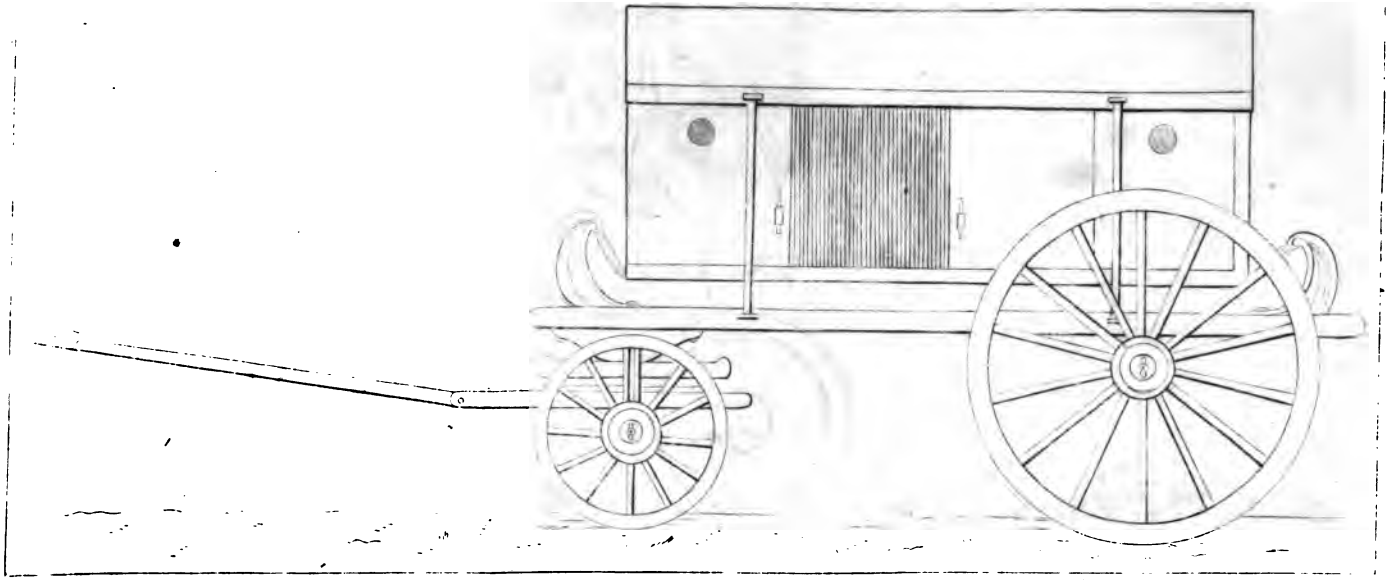




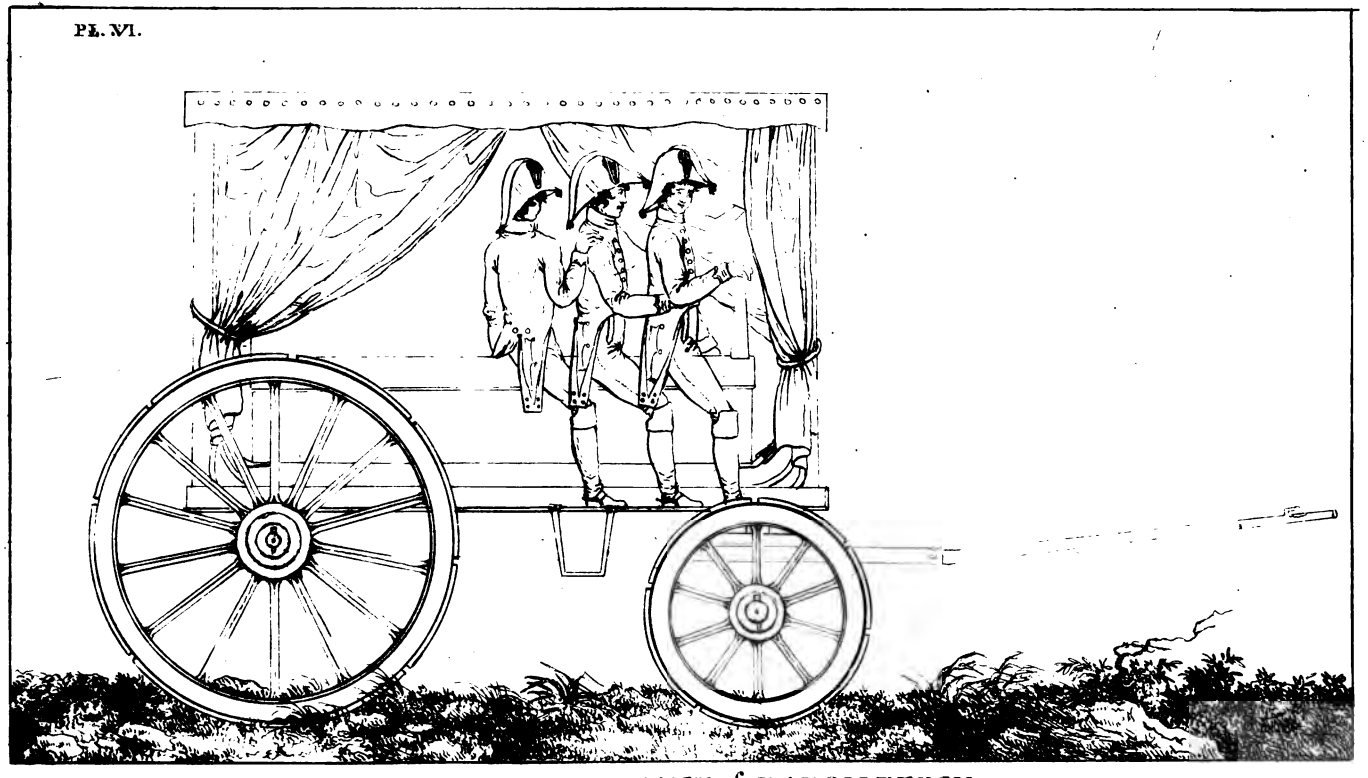








PL. VI.



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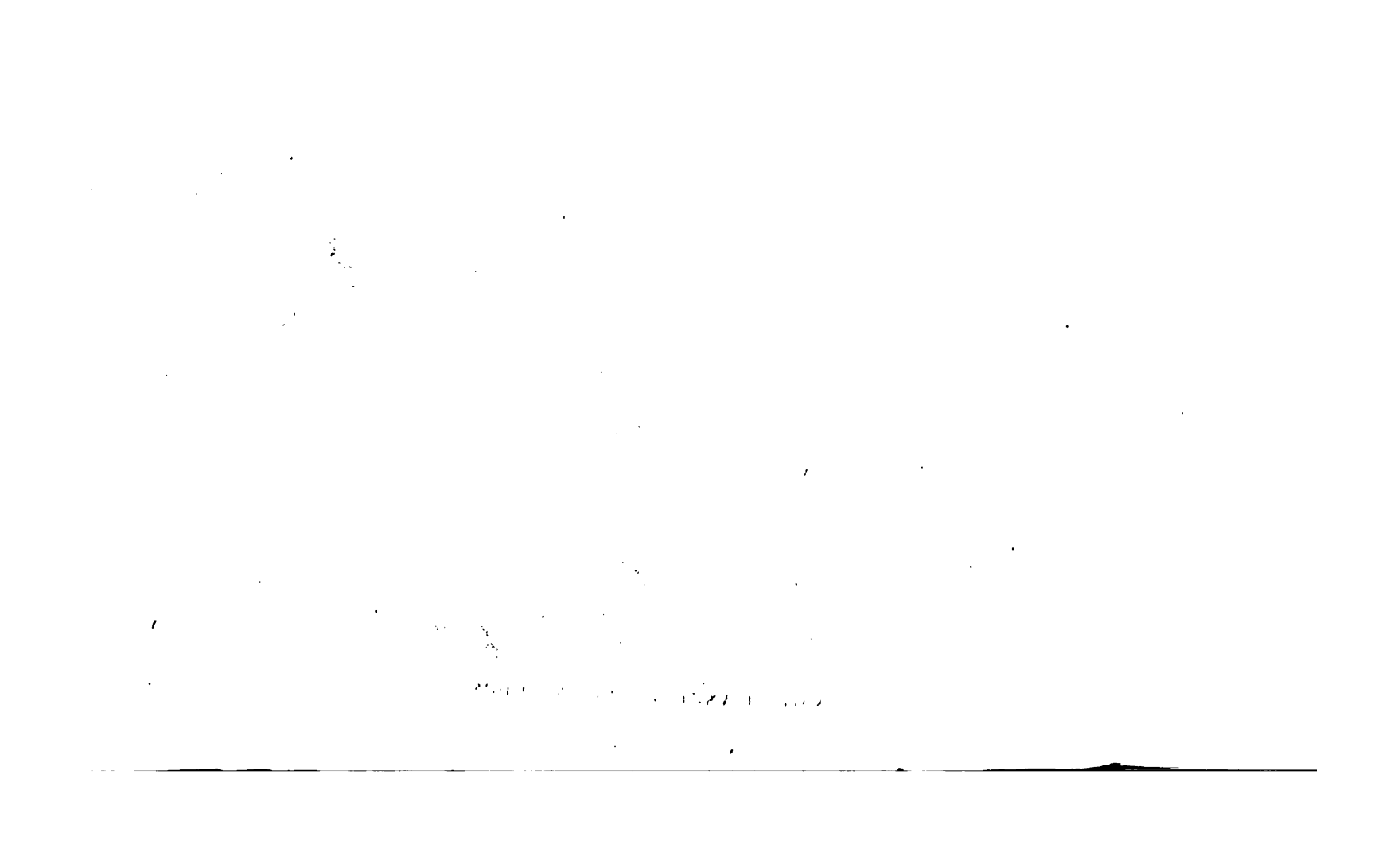
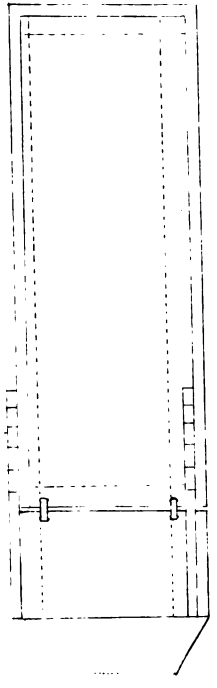
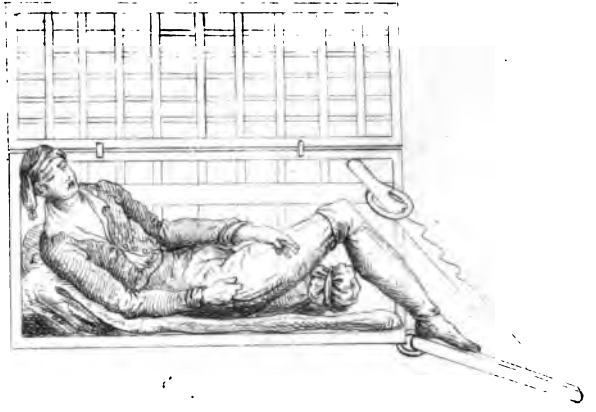
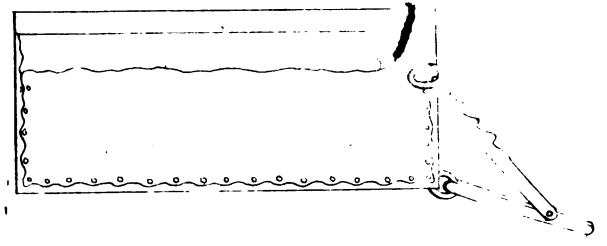
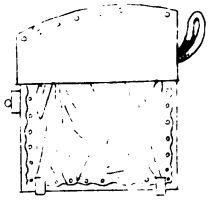


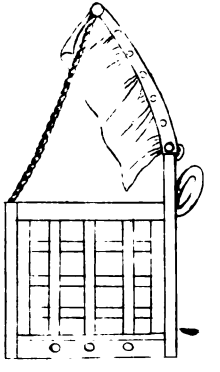
PL. VIII.











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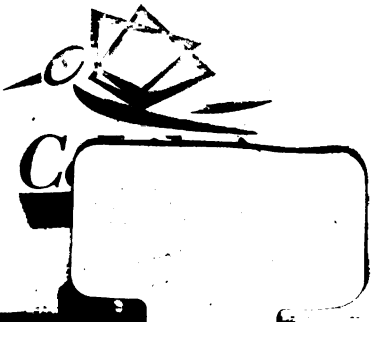
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